

RAILROAD GAZETTE

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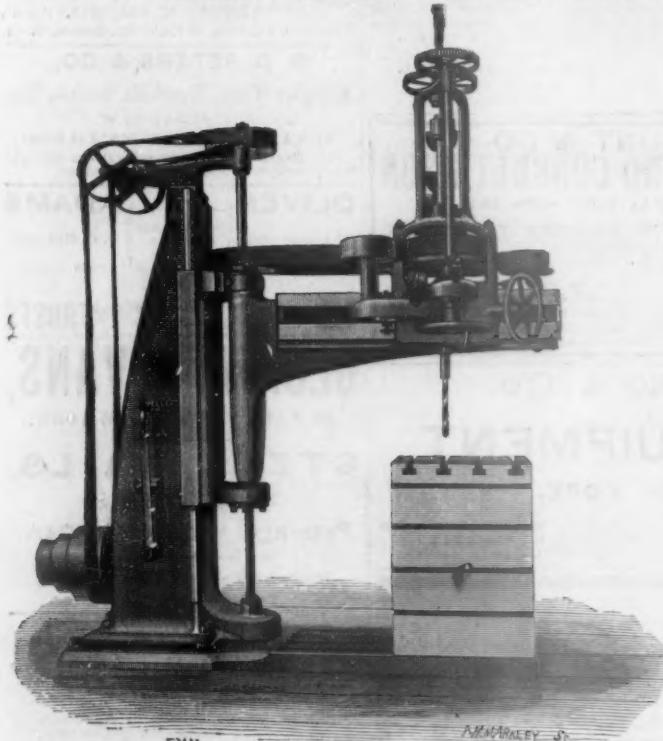
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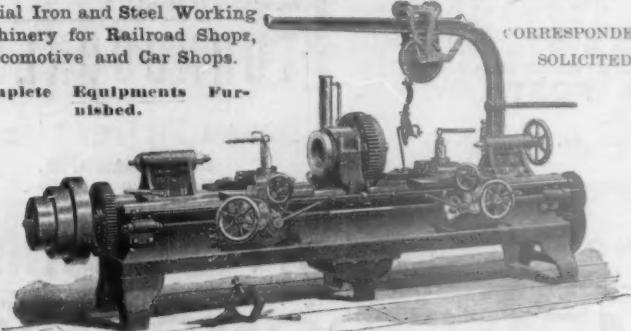
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We take this opportunity to thank our friends and customers for the many favors accorded us, and hope they will extend the same courtesies to the above firm.

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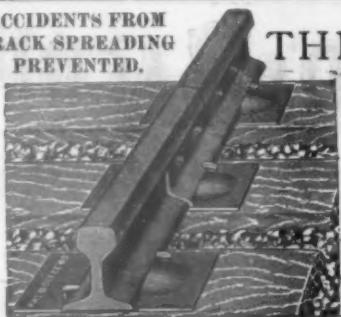
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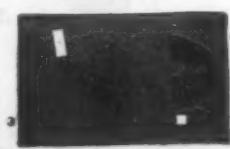
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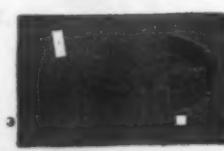
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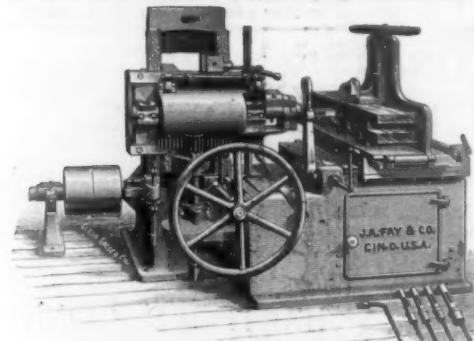
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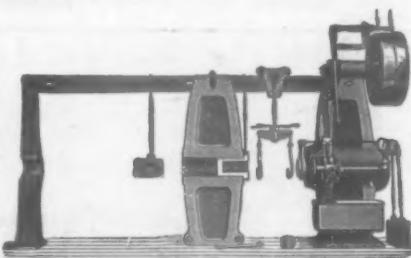
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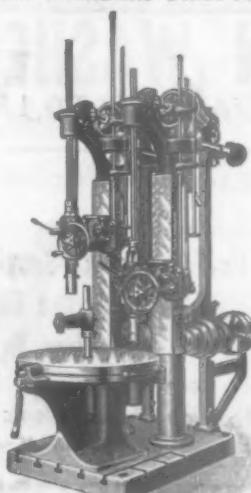
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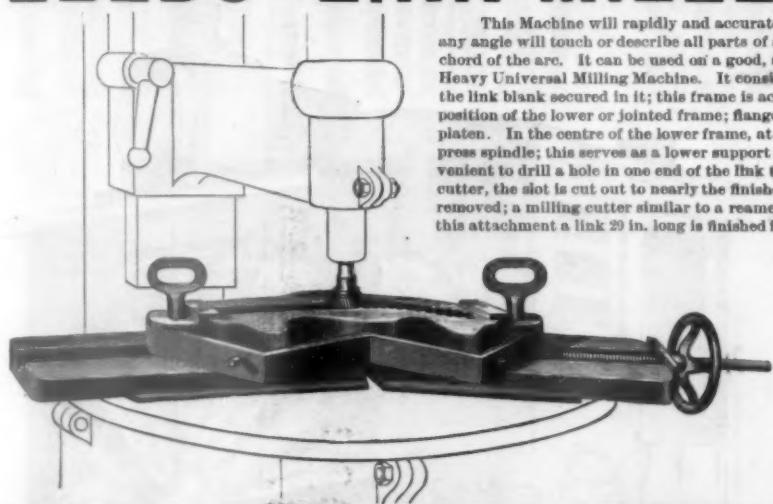
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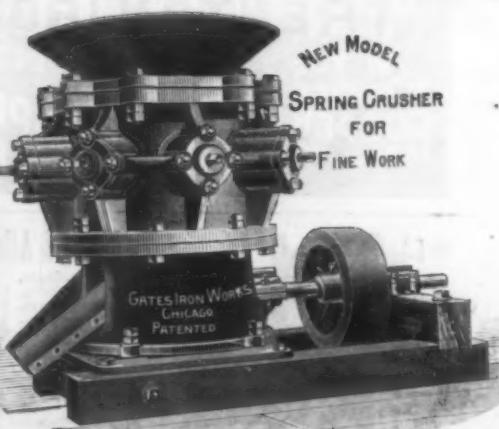
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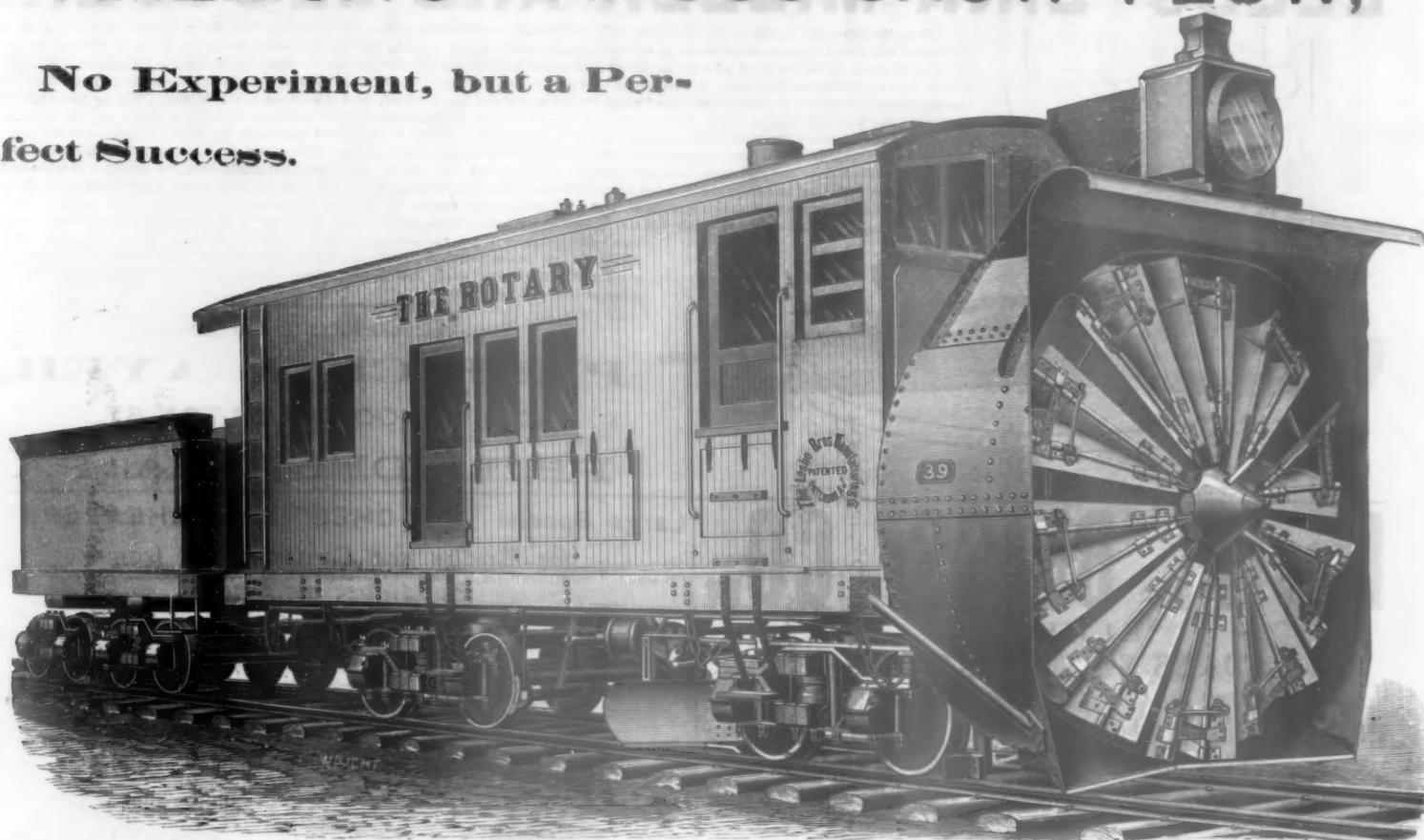
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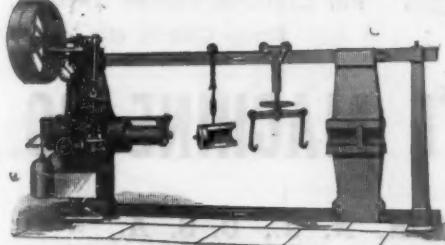
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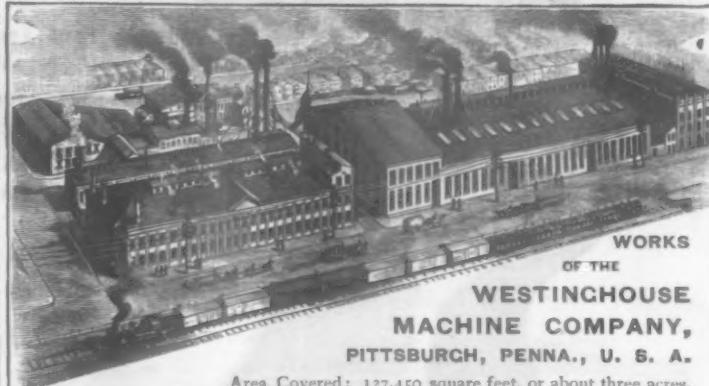
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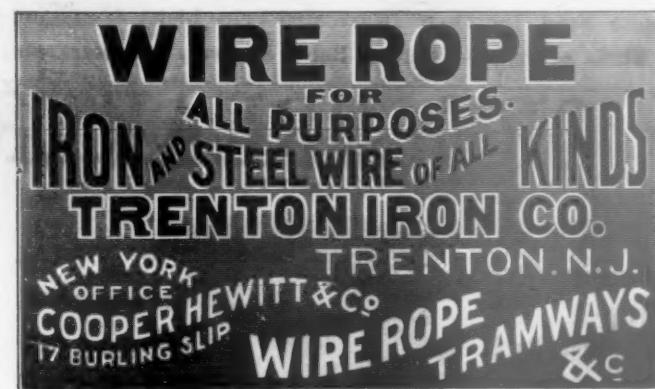
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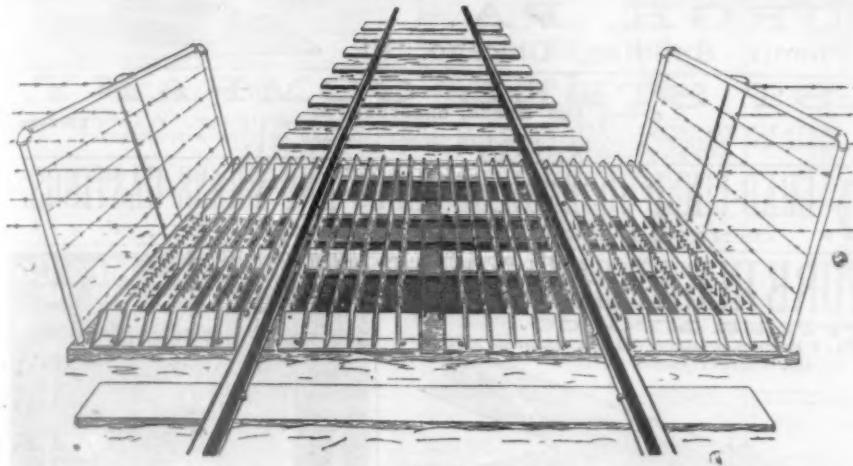
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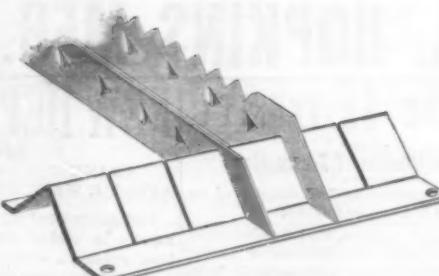
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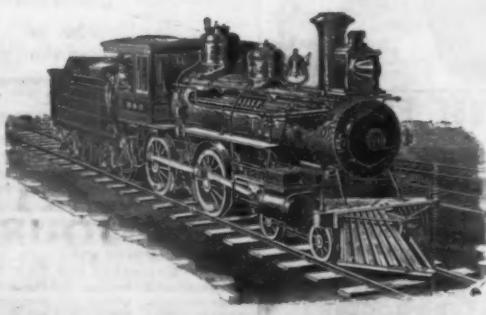
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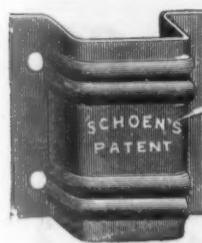


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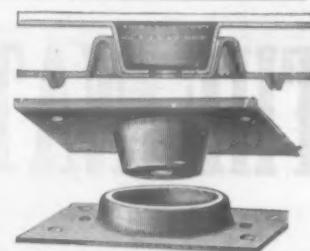
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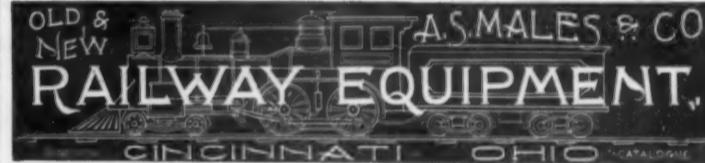
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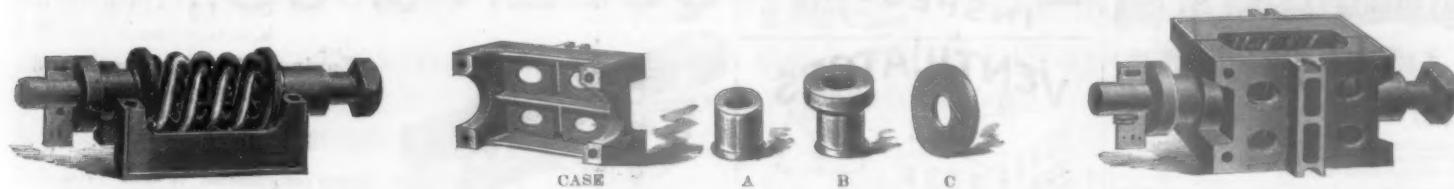
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	Percentages of Breakages.	Life.	Price.	Replacement of breakages. 75% without charge.	Cost per car per year.	Cost per 1,000 cars per year.
ONE of the PIVOTED TYPE	11,862 Couplers for 1 year on basis 10 mos. records. Heads, 27 ⁸⁷ ₁₀₀ Knuckles, 54 ⁸⁹ ₁₀₀	Heads, 3 yrs. 6 mos. Knuckles, 1 yr. 9 mos.	\$20.00 per car.	Heads, 25% at \$9.20 Knuckles, 25% at \$2.80	\$2.04	\$2,040
DOWLING TYPE	10,676 Couplers for 1 year on basis 14 mos. records. Heads, 3 ⁸⁹ ₁₀₀ Knuckles, 12 ⁸⁴ ₁₀₀	Heads, 30 years Knuckles, 8 years	\$20.00 per car.	Heads, 25% at \$8.00 Knuckles, 25% at \$4.00	39c.	\$390

Drop Tests with 1,640 lbs. Weight, N. Y. Central Car Shops, W. Albany, N. Y.

ONE OF THE PIVOTED TYPE.

TEST No. 1.

5 ft. blow. Knuckle closed 3-8 inch Pivot pin slightly bent.
7 " " " 1-2 " " " badly "
9 " " " 7-8 " Punched hole through
back and side of drawhead at buffering point.
Knuckle and pivot pin useless.

TEST NO. 2.

11 " " Guide arm, both lugs, back and shank of draw-
head broken.

TEST NO. 3.

18 " " Knuckle, drawhead, lock, pivot broken in many
pieces.

To Railway Companies who are willing to make similar comparative tests, we will furnish our Standard couplers without charge. You may select them from our stock or take them from cars in service, and we will replace them, and should you not have any of the other Type at hand we will furnish them also, without charge, and pay all expenses of the tests.

In a coupler confined to the M. C. B. lines it is impossible to effectively distribute 36 1-2 lbs. of steel in a knuckle having a pivot hole, buffering against the side of the drawhead, thereby causing a shearing strain, which breaks the knuckle and lugs from the drawhead and bends the pivot pin, making it inoperative. It is a mechanical impossibility for such a coupler to stand the strain of 60,000-lb. cars (which are 20,000 lbs. heavier than when the pivot type was first introduced.)

The Standard knuckle has 58 lbs. of steel so distributed as to stand the strains and protect the drawhead, is without a pivot hole, and is especially designed for heavy service and the increased weight of cars within the last few years. By the peculiar formation of the Dowling type of coupler, the buffering strain is taken in a line with the shank and draft rigging, thereby equalizing the shock at different points.

One reason why this particular pivoted drawhead breaks more largely than the Dowling type is because in order to allow the lock to rotate on an additional pivot pin in the guide arm the head is cut away so that it cannot be strengthened in its weakest part.

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STANDARD, DOWLING TYPE.

TEST NO. 1.

5 ft. blow Uninjured.
7 " " Knuckle closed 1-8 inch. Drawhead uninjured.
9 " " " 1-4 " " "
12 " " broke at pivot circle. " "

TEST NO. 2.

20 " " broken. Shank of drawhead bent 1-2
inch out of line.

TEST NO. 3.

(Drawhead, malleable iron; knuckle, forged steel.)
16 ft. blow. Knuckle closed 1-4 inch. Drawhead uninjured.
18 " " Tongue of knuckle cracked. Drawhead uninjured.

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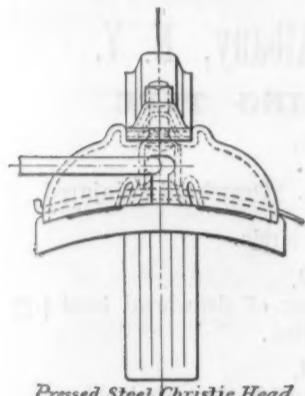
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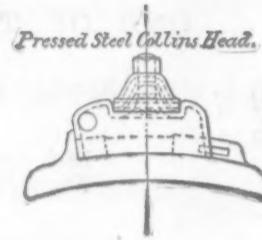
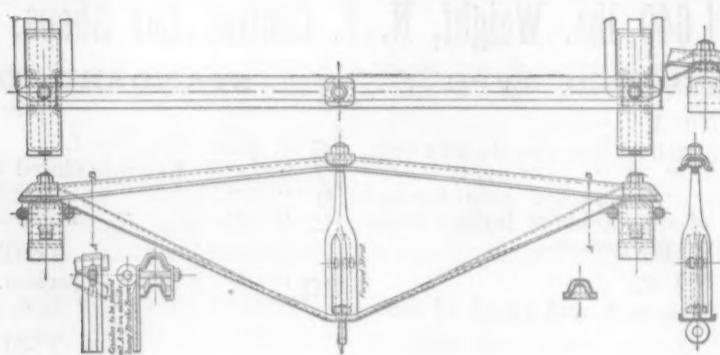
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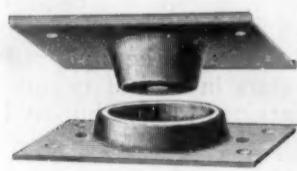
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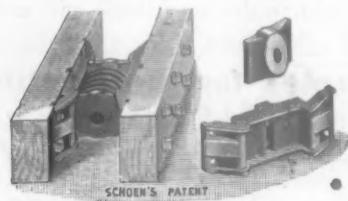
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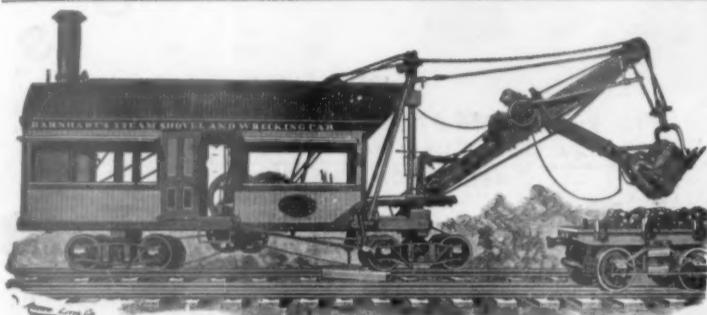


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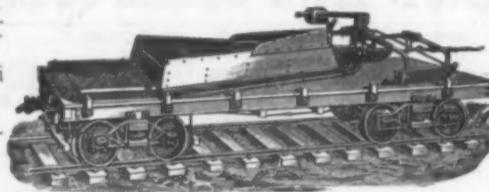
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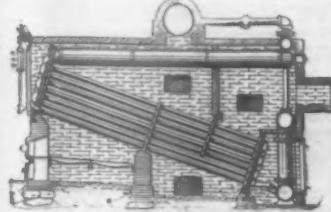
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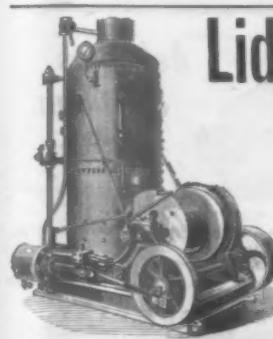
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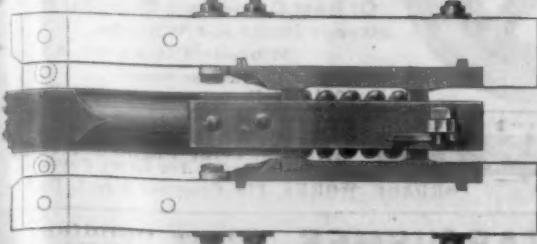
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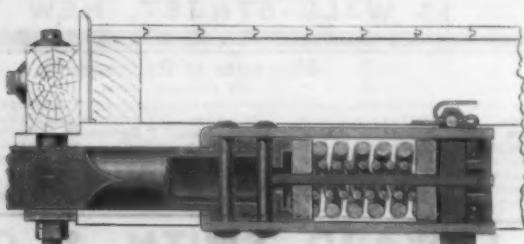
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Perspective.

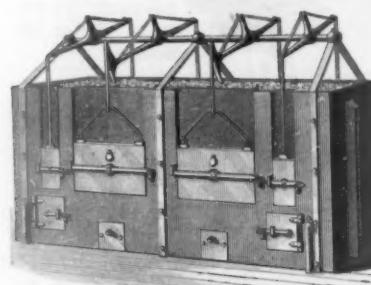


Sectional View No. 2.

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NEW YORK

FRIDAY, MARCH 4.

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An Ambiguous Train Order.

Atlantic Coast Line,
WILMINGTON, N. C., Feb. 5, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Please note the inclosed order and give me your opinion as to whether No. 15 takes the siding at both meeting points or not. No. 15, No. 500 and No. 14 are all first-class trains. No. 15 is southbound, and has right of track according to time table. The order of stations going south is Mt. Joy, Belfield, Graham, Roanoke.

DISPATCHER.

[Copy of Order.]
No. 15 and No. 500 will meet at Belfield.
No. 15 and No. 14 will meet at Graham.
No. 15 takes siding.

[As the sentence directing No. 15 to take the siding is put in a paragraph by itself it is fair to assume that it refers to both of the meetings that the order covers. If the dispatcher intended it to refer to Graham only, he should have made sure that it was included in the same paragraph with that referring to No. 14, and should also have seen that this paragraph was surely separated from that referring to Belfield. But, as every one familiar with the telegraph knows, the correct separation of paragraphs is a matter to which operators give little attention and on which they have no rigid rules; and a dispatcher should therefore be careful not to make an order whose clearness depends upon such fine distinctions. On most roads the recipients of this order would be justified in assuming either or both of the separations between sentences to be accidental, and each conductor would therefore have to fall back on rule 121, requiring him, in case of doubt, to take the safe side. No. 500 should assume that No. 15 might not take the siding at Belfield, and No. 15 should assume that No. 500 might be expecting that it (No. 15) would be on the siding there. The dispatcher ought to have sent two separate orders, or else have said "No. 15 take the siding at both places" or "at Graham, but not at Belfield." —EDITOR RAILROAD GAZETTE.]

Spokes of Driving Wheels.

ALTOONA, Pa., Feb. 22, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I note a communication in the last number asking why spokes are made of oval form.

First, when solid. In a casting the interior of a large mass is weak from shrinkage stress, sometimes being almost honeycombed. If the spokes were cast in this form (a), the weak part would be where it is shaded, exactly where strength is needed. If in this section (b), there is also weakness where strength is needed, besides the sharp corner which are always had in castings. But in

(c), which is also the vertical section of the "Straight-Line" engine cast connecting rod, the weak place is at the centre as shown shaded, and where it will not greatly detract from the moment of inertia. Allow me to quote from a former Superintendent of the Straight Line Engine Co., Prof. A. W. Smith, now of Madison, Wis.:

"In case wrought material is used for members subjected to simple transverse stress, the first and second sections above are probably best; but if cast material is used, the third form is probably preferable for these reasons: First, thin parts of castings have the best ma-

terial, i. e., most sound; in the last section the best material is where it is most effective to resist stress. Second, the pattern work in case of the third form is simpler and maintenance of patterns easier."

For cored spokes the oval form is perhaps a clinging to the section best for solid spokes. There is, however, the advantage that this form avoids all sharp corners. When fluid metals solidify, the threads of crystallization arrange themselves at right angles to the surface. A sharp corner is a well known weak spot in a casting, and for this reason the line A-B is a region of weakness. On a larger scale the lines of crystallization would look like this (d). The continuity of fiber is broken at the corner.

But radically it seems to me hardly correct to speak of the spokes as having such a great excess of strain sideways. How about the exceptionally severe stress

d. when, as I have observed, a consolidation locomotive is rapidly slipping its drivers, and sand is suddenly applied? The sand may reach the forward driver on one side before it does the other side. Then the very great and suddenly increased friction of one driver is overcome by the steam pressure, the momentum of two large pistons and connections of the heavy rods, and of eight drivers. This great stress is not to be overlooked, and the spokes, while made deep enough to withstand side stresses against the rails, must also be thick enough the other way.

H. WADE HIBBARD.

Some Curious Results of Axle Testing.

Canadian Pacific Railway Company,
Office of the Master Car Builder,
MONTREAL, Feb. 24, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The following report of tests recently conducted at the Canadian Pacific Railway Works at Montreal will probably be of wider interest than for those immediately concerned, as the results are curiously divergent, and in the case of two axles surprisingly high, so it is sent to you for the benefit of your readers.

Although only one sample of each kind of axle was tested, the results of Nos. 3 and 6 may be taken as giving some indication of what good mild steel axles will stand, especially when compared with Nos. 2 and 4 best York shire iron axles. Incidentally they also throw some light on the weakening effect of suddenly cooling journals which have become heated in service.

Axles Nos. 3 and 6 were both at a temperature of about 32° F., at the beginning of test, but the middle part of each became raised to about 120° by repeated blows of the falling weight. They were then covered with snow for some minutes, and further tested. No. 3 broke at the next heavy blow, while No. 6 was given a lighter blow, which it stood without fracture, but broke at the next heavy blow. The fractured sections of both these axles showed a fine grained crystalline structure, uniform throughout, except round the outside where the grain was much finer for an average depth of about $\frac{1}{16}$ in. This change in structure appeared to be due to the chilling effect of the snow.

The results are given in detail for each axle tested in the attached report.

JOHN HIGGINSON, Master Car Builder.

Record of test of seven car axles, conducted at Canadian Pacific Railway Locomotive Works, Montreal, Feb. 22, 1892.

The method of test was by a falling weight of 1,653 lbs. striking the axle midway between its supports, which were 3 ft. apart clear, the axle being turned over as to bend both ways alternately. Each axle was first subjected to a specified test, and, if not broken, was further tested to destruction.

No. 1.—Passenger car axle with $\frac{3}{4}$ in. \times 7 in. journals. Made September, 1891. Material, Krupp steel. Diameter of axle in middle, $\frac{4}{5}$ in. Tested as follows:

Specified test: Six blows at 23 ft. Axle not broken.

Ext. test: Blows at 4 ft. Broke at the eighth blow, the second above the specified test. Fracture, fine grained crystalline and uniform.

No. 2.—Passenger car axle with $\frac{3}{4}$ in. \times 7 in. journals. Made Oct. 22, 1891. Material, best Yorkshire scrap iron. Diameter of axle in middle, $\frac{4}{5}$ in. Tested as follows:

Specified test: Six blows at 22 ft. Axle not broken.

Ext. test: Fall, 38 ft. Axle broke at the seventh blow, the first above the specified test. Fracture, coarse granular and uniform.

No. 3.—Passenger car axle with $\frac{3}{4}$ in. \times 7 in. journals. Made Sept. 2, 1891. Material, Phoenix special steel. Diameter of axle in middle, $\frac{4}{5}$ in. Had been in service one month.

Specified test: Six blows at 20 ft; axle not broken.

Ext. test: Fall 4 ft.; axle broke at eighteenth blow. After the seventeenth blow the middle portion of the axle, which was quite warm from the repeated concussions, was suddenly cooled, by being covered with snow for about five minutes, and the eighteenth blow was given, when the axle broke. Fracture was fine grained, crystalline and uniform, except round the outside, where there was a fringe of finer grain, extending nearly all round, and about one-sixteenth of an inch deep.

No. 4.—Passenger car axle with $\frac{3}{4}$ in. \times 8 in. journals. Made Jan. 18, 1891. Material, best Yorkshire scrap iron. Diameter of axle in middle $\frac{4}{5}$ in. full. Tested as follows:

Specified test: Six blows at 25 ft.; axle broke at the fourth blow, having failed to stand the specified test. The fracture was coarse granular, with about 15 per cent. of dirty iron.

No. 5.—Passenger car axle with $\frac{3}{4}$ in. \times 8 in. journals. Made September, 1891. Material, Krupp steel. Diameter of axle in middle $\frac{4}{5}$ in. bare. Tested as follows:

Specified test: Six blows at 25 ft.; axle broke at the third

blow, failing to stand the specified test. Fracture fine grained, crystalline and uniform.

No. 6.—Passenger car axle with $\frac{3}{4}$ in. \times 8 in. journals. Made July 22, 1891. Material, Phenix special steel. Diameter of axle in middle, $\frac{4}{5}$ in. Tested as follows:

Specified test: Six blows at 25 ft.; axle not broken.

Ext. test: Fall 40 ft.; axle broke at 28th blow. After the twenty-sixth blow, being the twentieth extra blow at 40 feet, the middle portion of the axle was covered with snow for about 8 minutes, after which it stood one blow at 25 feet, and broke at the next at 40 ft. Fracture fine grained, crystalline and uniform, except round outside, where there was a finer grained edging about 1-16 in. deep, extending nearly all round.

No. 7.—Freight car axle with $\frac{3}{4}$ in. \times 7 in. journals. Made 1891. Material, steel. Diameter of axle in middle, $\frac{4}{5}$ in.

Specified test: Four blows at 10 ft. and 2 at 15 ft., axle not broken.

Ext. test: One blow at 30 ft., others at 40 ft.; axle broke at the ninth blow, the third above the specified test. Fracture fine grained, crystalline and uniform.

The Late Brake Tests.

TO THE EDITOR OF THE RAILROAD GAZETTE:

When it was found that the action of the old style triple valve of the New York Air Brake Co. was slower than was desirable, the emergency feature was modified to quicken it. It was very important that the action of the new valves should be shown on 50-car trains in actual service, in order to obtain an official record regarding their efficiency in applying the brakes to the last car and in stopping trains as quickly as possible. Two opportunities were offered where such tests might be made if sets of valves could be supplied within a very limited time, the first on the Chicago, Burlington & Quincy Railroad, and the second on the Lehigh Valley Railroad. The valves for both these tests were rushed through the shop in the same week and were only completed in time by working night and day. It is not strange, therefore, that they were not finished as carefully as they should have been. They were tested to see that the application was within the three-second limit and that they would release with the proper handling of the engineer's valve, but there was no time for refined shop tests. To this cause alone is due the failure of some of the valves to release properly on those tests. We desired to postpone the Lehigh Valley test until we could get another set of valves finished with proper care, but as everything else was ready it was decided to make the runs to determine the efficiency of stopping, and make a test of a second lot of the valves the next week. This second lot of valves were duplicates of the first, but they had received proper care in manufacture.

This test occurred Thursday, Feb. 25, at Packerton, on the Lehigh Valley Railroad, and a full report is given below. The perfect manner in which the brakes released under all conditions dispels the criticism "the construction of this triple valve precludes the securing of a sure release without such modifications as will seriously interfere with other equally important functions." There was no modification or alteration whatever; simply less waste in manufacture.

We are now ready to supply triple valves, which are just as sure to release as the Westinghouse valves, whether used with our duplex pump and our engineer's valve or with the Westinghouse pump and the Westinghouse engineer's valve. Moreover, our valves perform all other functions fully as well as, and some functions better than, the Westinghouse.

The superiority of our engine equipment has been demonstrated, and we feel that we are to be congratulated because of our full success in producing a car equipment which is also practically superior to the Westinghouse. We also congratulate the roads that they are now released from the monopoly so long maintained by the Westinghouse Company. Competition has not only improved the quality, but reduced the price, as it always does. We therefore feel sure that the roads will sustain us in our competition.

THE NEW YORK AIR BRAKE CO.,

C. A. STARBUCK, Vice-Pres.

RECORD OF TESTS.

Feb. 25, 1892, on Lehigh Valley Railroad, at Packerton, Pa., 50-car train, New York air brake.

First Test.—Standing test, 70 lbs. pressure in both train pipe and main reservoir (no excess). Emergency application for one second; handle of engineer's valve then put in release position and train pipe pressure pumped to 70 lbs. All brakes released promptly.

Second Test.—Same conditions. All brakes released promptly, but one (the twenty-sixth from engine).

Third Test.—Same conditions. All brakes released promptly.

Fourth Test.—Standing tests to show engineer the proper way to release a long train and make sure that any valves not recently cleaned would be certain to release; 70 lbs. pressure in both train pipe and main reservoir (no excess). Emergency application for one second, and then handle of engineer's valve put in release position until 58 lbs. were in train pipe. Handle was then placed in running position until 20 lbs. excess pressure was in main reservoir, then put in release position again. All brakes released promptly.

Fifth Test.—Same as fourth test except with excess pressure before commencing test. Train pipe pressure 70 lbs., and main reservoir pressure 93 lbs. Emergency application for one second, and then handle of engineer's valve placed in release position until 58 lbs. was in train pipe. Handle was then placed in running position until 20 lbs. excess pressure was in main reservoir, then put in release position again.

Sixth Test.—To make service application and see how

looks the rule that in construing a statute to ascertain whether a given case comes within its terms, it is the duty of judges, in Lord Coke's language, "to make such construction as shall suppress the mischief and advance the remedy, and to suppress subtle inventions and evasions for the continuance of the mischief" (Heydon's case, 3 Rep., 7). It is to be presumed that the mischief which the Legislature of the State of New York found in the consolidation of parallel or competing roads was the prevention of competition. The writer does not agree that this is by any means always a mischief in the case of railroads, but if it be, it is little absurd to prohibit consolidation and yet allow leasing for five centuries.

In the case of the New York Central and West Shore railroads above cited, the authority to lease was contained in a statute of the State of New York which provided that "it shall be lawful hereafter for any railroad to contract with any other railroad corporation for the use of their respective roads, and thereafter to use the same in such manner as may be prescribed in such contract" (Laws of 1839, Chap. 218).

Col., a passenger train was run into at the rear by another passenger train, badly damaging the rear car. One passenger injured.

2d, evening, on Pennsylvania road, near Elizabeth, N. J., a freight train coming to a stop at a crossing broke in two and the rear part ran back down grade and collided with a following freight, demolishing a caboose and several cars and overturning the engine. The westbound track was obstructed and a number of passenger trains were delayed. Two passengers who got off to walk to Elizabeth were run over by a train and killed.

5th, on Central of New Jersey, near Cranford, N. J., a coal train ran into the rear of another freight at the foot of a steep grade, making a very bad wreck, which was partially burned up. Engineer and fireman seriously injured.

7th, on Little Rock & Fort Smith, near Little Rock, Ark., a freight train descending a steep grade broke in two, and the rear portion afterward ran into the forward one, wrecking eight cars. A brakeman was badly injured.

10th, on Pittsburg, Cincinnati, Chicago and St. Louis, at Steubenville, O., a westbound passenger train standing at the station was detained some time by hot boxes, and a following passenger train approaching at high speed ran into it, wrecking the rear car. Several other

passenger train ran over a misplaced switch and into some freight cars standing on the side track, badly damaging the engine and several cars. Fireman injured.

23d, on Illinois Central, at Jackson, Miss., a passenger train ran into some empty freight cars standing on the main track, making a bad wreck and killing the fireman; the engineer was badly injured. It is said that the engineer misunderstood an order which had been given directing him to run around the freight cars.

25th, 5 a. m., on Cincinnati, New Orleans & Texas Pacific, near Danville, Ky., a passenger train which had been stopped by a disabled freight train was run into at the rear by a following freight, which approached on a descending grade at uncontrollable speed. The rear car, a sleeper, was completely wrecked and the next one crushed for about one-third its length. The forward portion of the train was vestibuled. The freight engine and 5 cars were wrecked. Engineer, fireman and sleeping car porter injured. It is said that there were no passengers in the rear car and few or none in the next one. It is said that the brakeman of the passenger train did not go back promptly with his danger signal. The wrecked rear sleeping car was accidentally burned up several hours afterward.

26th, at the Union Depot, in Omaha, Neb., a passenger train ran over a misplaced switch and into an empty engine, pushing the latter into another passenger train standing in the depot. Both engines were badly damaged; one engineer and one fireman injured.

27th, on Columbus & Western, at Henryville, Ala., a freight train, which had slackened speed in order to leave an identification card with a work train which had been laid up for the night, was run into at the rear by a following freight, the engine and several cars being wrecked. Engineer badly injured.

27th, 2:30 a. m., on Baltimore & Ohio, at Jackson, Md., a freight train broke in two, and the detached parts afterwards collided, wrecking 10 cars. A fire caused by the explosion of 3 oil tank cars burned 2 cars of sugar.

28th, on Lehigh Valley, near Schuylkill Haven, Pa., a freight train ran into the rear of a preceding freight, badly damaging the engine and caboose. A brakeman was killed.

29th, on New York Central & Hudson River, near Churchville, N. Y., a freight train broke in two and the rear portion was run into by a following freight, wrecking the engine and a dozen cars. A brakeman in the caboose was killed.

29th, 5 a. m., on New York Central & Hudson River, near De Witt, N. Y., a freight train, which had slackened speed to pick up a flagman, was run into at the rear by a following freight, wrecking six cars, three of which were burned. A brakeman was killed and two other trainmen badly injured.

31st, on Boston & Maine, at North Thetford, Vt., freight train ran into the rear of preceding freight, wrecking 10 cars and injuring the conductor.

And 32 others on 24 roads, involving 7 passenger and 51 freight and other trains.

BUTTING.

5th, at 1:47 a. m., on Wabash road, at Aladdin, Ill., butting collision between eastbound passenger train No. 46, standing at the station, and westbound passenger train No. 41, which approached at high speed, having run a half mile beyond the switch where it should have entered the side track, train 46 having the right of road after 1:45 a. m. The wreck was a very bad one and 3 passenger and 2 baggage cars were burned up. One passenger and 2 engineers killed, 6 passengers and 2 firemen injured. It is believed that the engineer of train 41 was asleep.

6th, on New York, Ontario & Western near Smyrna, N. Y., butting collision between a mixed train and a light engine, both running at considerable speed. Both locomotives exploded and were completely wrecked. Both engineers and one fireman were killed. The runner of the empty engine had forgotten a meeting point.

6th, on New York & New England, at North Oxford, Mass., butting collision between a northbound passenger and a southbound freight train, wrecking both engines and several freight cars. One fireman injured.

12th, on Cincinnati, New Orleans & Texas Pacific, at Lexington, Ky., an engine wiper who was assisting the hostler became confused in attempting to reverse an engine under steam and jumped off. The engine ran out upon the main track a mile and a half and collided with a freight train, wrecking both engine and several cars loaded with cattle. Fireman injured by jumping.

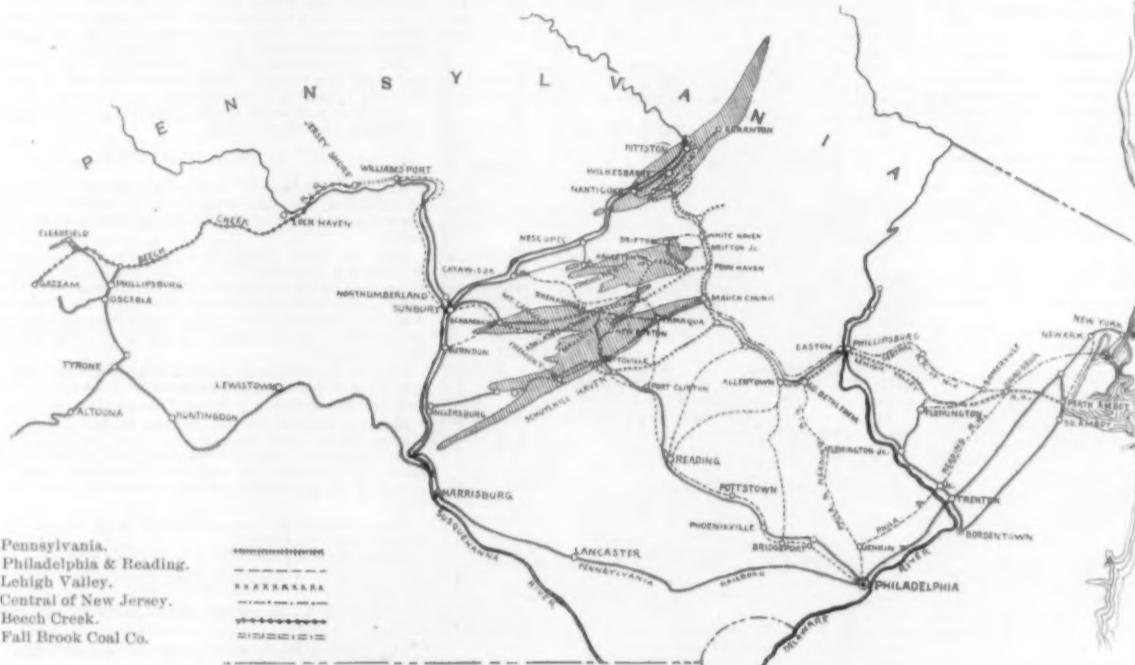
12th, on Louisville, New Orleans & Texas, at Remy's, La., a freight train ran over a misplaced switch and into the head of another freight standing on a siding, damaging both engines and several cars. A boy had both legs crushed.

19th, on Rome, Watertown & Ogdensburg, in Oswego, N. Y., butting collision between switching engines, injuring one engineer.

21st, on Illinois Central, near Crystal Springs, Miss., butting collision between two freights on a curve, due, it is stated, to a train dispatcher's negligence. Both engines and 10 cars wrecked. Two trainmen injured.

22d, 7 p. m., on Atlantic Coast Line at Florence, S. C., butting collision between freight trains, killing an engineer and injuring 7 other trainmen. One of the conductors ran past the point where he had been ordered to wait for the other.

22d, on Atlantic & Pacific near Blue Water, N. Mex., butting collision between passenger trains, wrecking both engines and several cars. Conductor, both firemen and both engineers killed.



Sketch Showing Railroads Entering Anthracite Coal Fields of Pennsylvania.

NOTE.—This map was submitted by Mr. A. J. Cassatt, with his letter to the Governor of Pennsylvania, mentioned editorially last week.

In 1888 the question arose in the State of Nebraska under somewhat different circumstances. The statutes of that State allow leasing of railroads where the roads of the lessor and lessee companies will form a continuous line, and the Supreme Court of that State held that the express mention in the statute of continuous lines implied the exclusion of authority to lease parallel or competing lines, and declared void a lease of the Atchison & Nebraska Railroad to the Burlington & Missouri River Railroad. The Court in this case expressly stated in its opinion that it placed its decision entirely upon the restricted language of the statute, but it then proceeded to discuss the Nebraska constitutional prohibition against the *consolidation* of parallel or competing lines, and stated that the word "consolidate" was "used in the constitution in the sense of join or unite" and that the law could not be evaded, therefore, by substituting a lease for a deed of conveyance (State *vs.* Atchison & Nebraska R. R. Co., 24 Neb., 143).

The railroad lawyer may therefore take his choice between the dictum of the highest court of Nebraska and the opinion of a judge of the Supreme Court of New York and advise his client accordingly. If the consideration of public policy, as expressed by the law making authority, is to be the guide to statutory construction, the dictum of the Nebraska court would appear to express the soundest view of the law; but the upholder of the theory that the prohibition against consolidation does not prohibit a lease for centuries may gain some comfort from the rule which has been laid down that authority to consolidate does not confer authority to lease (Mills *vs.* Central R. R. Co., 41 N. J. Eq., 1; Archer *vs.* Terre Haute, etc., R. R. Co., 102 Ill., 403). For if authority to do the greater does not include authority to do the less, it may well be argued that prohibition against the greater does not include prohibition against the less.

Train Accidents in the United States in January.

COLLISIONS.

REAR.

1st, on Baltimore & Ohio, near Franklin, O., a freight train broke into three parts and two of them afterwards collided, wrecking 10 cars and damaging a bridge. Five tramps were injured, two of them fatally.

1st, on Chicago, Rock Island & Pacific, at Burlington,

cars were damaged but no passengers were injured, the car that was the most damaged having only five persons in it. One trainman was injured. It is said that the second train ran past a fixed red signal.

10th, 3 a. m., on Chicago & Northwestern at Vandyne, Wis., a freight train ran over a misplaced switch and into the rear of a preceding freight, wrecking the caboose and badly injuring a brakeman.

11th, on Duluth, South Shore & Atlantic, near Marquette, Mich., a train loaded with logs became uncontrollable on a steep grade and ran at high speed to L'Anse, where it struck the rear of a local freight, wrecking both trains and destroying a bridge.

12th, 5 a. m., on New York, Lake Erie & Western at Castile, N. Y., a Lehigh Valley freight train ran into the rear of a preceding freight wrecking 10 cars, which were burned up, together with the bodies of 2 trainmen, who were killed in the wreck.

12th, on Cambria & Clearfield, near Hastings, Pa., a mixed train standing at the station was run into at the rear by a light engine; 3 passengers injured.

14th, on Pittsburgh, Cincinnati, Chicago & St. Louis, at Colliers, O., a gravel train was run into at the rear by a following freight, injuring 3 laborers.

16th, on Cincinnati, Hamilton & Dayton, near Elmwood, O., a passenger train ran into the rear of a preceding freight, wrecking the caboose and the freight engine. A portion of the wreck was burned up. Three passengers injured.

17th, on New York, Lake Erie & Western, at Attica, N. Y., a freight train, with a pushing engine, standing at the station, was run into at the rear by a following freight which became uncontrollable on a descending grade, both engines and 9 cars badly damaged; conductor injured.

17th, on Baltimore & Ohio, near Martinsburg, W. Va., freight train ran into the rear of a preceding freight which had been stopped because broken in two. The second train had two engines, both of which were badly damaged, together with several cars. Both of the engineers were injured.

18th, on New York & New England, near North Windham, Conn., freight train ran into the rear of a preceding freight, wrecking two cars and injuring a brakeman.

19th, on Chicago & Northwestern, near Sharon, Wis., a passenger train ran into the rear of a preceding freight, wrecking the caboose and one car of flour, which were burned up. Fireman injured.

20th, on Illinois Central, near Guthrie, Ill., a freight train ran into the rear of a mixed train, killing one passenger and the engineer.

22d, on Atchison, Topeka & Santa Fe, at Clements, Kan., a freight train standing at the station was run into at the rear by a following freight, derailing eleven cars. The caboose and one car were burned up, and one passenger was killed, his body being burned in the wreck.

22d, on Alabama & Vicksburg, at Clarksburg, Miss., a

25th, on Delaware & Hudson, at Scranton, Pa., butting collision of freight trains, wrecking both engines and several cars. A brakeman was injured.

27th, at St. Louis, Mo., under the Fourteenth street bridge, collision between a Chicago & Alton passenger train and a Missouri Pacific locomotive, both engines being considerably damaged. The engineer and fireman of the passenger jumped and were injured, as was also a passenger.

28th, on Pennsylvania road, at New Boston Junction, Pa., butting collision between a Pennsylvania and a Lehigh Valley passenger train in a cut, due to the failure of one of the trains to promptly side track for the other. Both engines were badly damaged. An engineer was killed, 2 other trainmen were seriously injured, and several passengers were bruised.

30th, on Iowa Central, at Middle Grove, Ill., butting collision between freight trains, killing an engineer and injuring six other trainmen.

30th, on Atchison, Topeka & Santa Fe, at Fountain, Colo., butting collision between a freight train and a switching engine, causing serious injuries to 2 trainmen.

31st, on Wabash road, near Warrenton, Mo., butting collision between freight trains, wrecking engines and several cars. One engineer was killed and the other injured. One of the trains ran past its meeting point.

And 9 others on 9 roads involving 2 passenger and 16 freight and other trains.

CROSSING AND MISCELLANEOUS.

3d, on Chicago, Burlington & Quincy, at Creston, Ia., collision between two switching freight trains backing in opposite directions, due to the breaking of a switch rail, killing a fireman and badly injuring an engineer.

4th, on Pittsburgh & Lake Erie near Beaver Falls, Pa., collision between a freight and a work train, killing a laborer and injuring three laborers and one brakeman.

7th, 4 a. m., on Chicago, Burlington & Quincy, at Bristol, Ill., a freight train moving through a crossover was struck by another freight coming from the opposite direction making a very bad wreck. Fireman killed and engineer injured.

9th, on Philadelphia & Reading, at Royersford, Pa., a freight train ran over a misplaced switch and into the side of a switching freight overturning both engines. Three trainmen injured.

14th, on Baltimore & Ohio, near Myersdale, Pa., collision between freight trains, blocking the road several hours. Fireman injured.

14th, 10 p. m., on Central of New Jersey, at Dunellen, N. J., a westbound freight, which approached the station at too high speed, ran over two misplaced switches, the first one being a trailing point and the second a facing point, which threw the train upon side track, where it ran a short distance. But the train was set back before the trailing point switch had been readjusted, and two or three cars were pushed through a crossover just as an eastbound passenger train came along, running at about 60 miles an hour. The engine and cars of this train were badly damaged, but none of them were derailed.

15th, on Baltimore & Ohio, at Port Royal, Pa., a passenger train ran into a freight train which was moving through a crossover track, wrecking several freight cars and injuring two trainmen. It is said the flagman of the freight did not properly signal the passenger train.

23d, on the crossing of the Savannah, Florida & Western and the Brunswick & Western, at Waycross, Ga., collision between freight trains, wrecking several cars and killing two tramps.

28th, 4 a. m., on Fall Brook Coal Co.'s Railroad, at Williamson, Pa., a freight engine standing in the yard was run into by a switching engine which had become uncontrollable. The runner of the switching engine was badly injured. After the collision, both engines being deserted, they ran out upon the road eight miles, when they stopped for lack of steam.

30th, on New York Central & Hudson River, at South Tonawanda, N. Y., a passenger train passing from single to double track was struck by a freight train moving in the opposite direction, upsetting the last two coaches and knocking off the smokebox of the colliding engine. One passenger injured.

And 26 others on 20 roads, involving 11 passenger and 40 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

2d, on Chicago, Burlington & Quincy, at New London, Ia., a westbound express with two locomotives, running about 45 miles an hour, was derailed by a broken switch rail. The second locomotive was badly damaged, and its engineer and fireman were slightly hurt.

2d, on Atlantic & Pacific, at Querine Cañon, N. Mex., a freight train was derailed by a misplaced or defective switch. The forward portion went down into a stream, killing the engineer and fatally injuring 2 other trainmen.

3d, on Gulf, Colorado & Santa Fe, near Cameron, Tex., an empty engine was derailed and overturned by the spreading of the rails. Engineer killed, and three other trainmen injured.

5th, on Northern Pacific, near Sentinel Butte, N. Dak., two locomotives and one car of a stock train broke through a burning bridge. One of the firemen was killed and the other seriously injured.

6th, on Chicago, Milwaukee & St. Paul near Sheldon, Ia., a freight train was derailed by a broken rail. Two trainmen injured.

6th, on Port Royal & Western Carolina, near Lulaville, Ga., passenger train derailed by a broken rail, injuring seven passengers.

7th, on Knoxville & Augusta, near Knoxville, Tenn., passenger train derailed by a broken rail. Seven passengers injured.

11th, 2 p. m., on Louisville, New Albany & Chicago, near Crawfordsville, Ind., a northbound passenger train running about 25 miles an hour was derailed by a broken rail, several cars being thrown down a high embankment. Two passengers were killed and 29 passengers and 5 trainmen injured. The baggage car first left the track and slid down the hill. The first passenger car, which was filled with passengers, rolled over three times and caught fire from the stove, some of the occupants being burned. The car was consumed, but the passengers all escaped and help arrived in time to save the rest of the train from burning. The next passenger car was completely wrecked and in it the worst injuries occurred. The rail was 56 lb., laid in 1882. It broke in at least 9 pieces. A flaw 15 ins. long was discovered in the head, extending from the underside of the head up to nearly the top of rail. The drainage of the road was good and there were 10 ties under this rail.

12th, 9 a. m., on Union Pacific, near Grand Island,

Neb., passenger derailed by a broken rail, the last car being overturned. Twelve passengers injured.

15th, 4 a. m., on Northern Pacific, near Brainerd, Minn., passenger train No. 9 derailed by a broken rail, the sleeping car being overturned. Flames immediately broke out and the wreck was consumed, two passengers being burned up in the sleeping car. Twelve passengers were injured, most of them being more or less burned. The mercury stood at 46 degrees below zero and the survivors suffered severely.

17th, on Chicago, St. Paul, Minneapolis & Omaha, at North St. Paul, Minn., a passenger train was derailed by a defective frog and collided with a switching engine. Seven passengers were slightly burned by being thrown against the stove.

18th, 9 a. m., on Chicago, St. Paul, Minneapolis & Omaha, near Black River Falls, Wis., a passenger train, running at high speed, was derailed by a defective switch, the sleeping car being overturned. Eight passengers and one trainman injured.

18th, 11 a. m., on Atchison, Topeka & Santa Fe, at [unclear], passenger train derailed by the breaking of a switch rod, the mail car being overturned and the mail agent injured.

19th, on Pittsburgh, Mc Keesport & Youghiogheny, at Rankin, Pa., a freight train fell through an iron trestle bridge some 40 ft. high, which had been weakened a moment before by a switching engine in the Carrie furnace yard (underneath) becoming uncontrollable and running against one of the supports of the trestle. Two brakemen were killed.

19th, on Michigan Central, near Grayling, Mich., passenger train running about 30 miles an hour derailed by a broken rail. Two passenger cars were badly damaged and several passengers injured.

19th, on Gulf, Colorado & Santa Fe, near Goldthwaite, Tex., passenger train derailed by a broken rail, the sleeping car being overturned; conductor and brakeman injured.

21st, on St. Louis, Iron Mountain, near De Soto, Mo., a northbound passenger train was derailed by a broken rail and three cars were overturned; 8 passengers and 3 trainmen injured.

21st, on Chicago, St. Paul, Minneapolis & Omaha, at Hamilton, Minn., passenger train derailed by a broken rail, 4 sleeping cars being overturned. The train was running rapidly and had 32 passengers aboard, but it is said only 2 or 3 were injured.

30th, 3 a. m., on Texas & Pacific, near Lobeline, La., passenger train No. 52 ran into a burning trestle and most of it was burned up. Engineman killed, 3 other trainmen and 2 passengers injured. A corpse in the baggage car was burned up in the wreck.

And 16 others on 15 roads, involving 8 passenger and 8 freight and other trains.

DEFECTS OF EQUIPMENT.

5th, on Philadelphia & Reading, near Bound Brook, N. J., 30 cars of a freight train were derailed and wrecked by the breaking of an axle. Two trainmen seriously injured.

6th, 6 a. m., on Baltimore & Ohio near Fairmount, W. Va., the baggage car in a westbound passenger train was derailed by a combination Janney & Miller coupler, which had been pulled out and fallen on the track. The car struck a coal chute, which was dislodged so that it wrecked the smoking car. Eight passengers and 3 trainmen were injured.

22d, on South Carolina Road, at Lake View, S. C., a mixed train was derailed by a broken flange under a freight car, the passenger and several freight cars being overturned. Brakeman and 2 passengers injured.

31st, on Cleveland, Cincinnati, Chicago & St. Louis, near Crawfordsville, Ind., freight train derailed by a broken flange on one of the wheels of the engine, 14 cars being wrecked. The fireman was badly scalded.

And 12 others on 9 roads, involving 1 passenger and 11 freight and other trains.

NEGLIGENCE IN OPERATING.

5th, on Western North Carolina road at Dyke Ridge trestle, 40 miles from Asheville, N. C., a locomotive which had been detached from a freight train at a steep grade became uncontrollable and was derailed and thrown off a high trestle into a creek, wrecking it completely and killing the engineer and fireman.

14th, on Ohio Southern, near Bainbridge, O., a long freight train became unmanageable on a steep grade and ran down some distance to a curve where it was wrecked. Two trainmen killed and 1 injured.

And 8 others on 8 roads involving 4 passenger and 5 freight and other trains.

UNFORESEEN OBSTRUCTIONS.

2d, night, on Newport News & Mississippi Valley, near Holmes, Miss., a passenger train ran over some sleepers which had been maliciously piled upon the track, overturning the locomotive. The fireman was killed and a tramp badly injured.

2d, on Louisville, New Orleans & Texas, near Leland, Miss., passenger train No. 1, derailed by a timber on the track, the engine and baggage car being thrown down a bank. The fireman was killed.

8th, on Little Rock & Fort Smith, at Reynolds Spur, Ark., a freight train ran over a misplaced switch and the engine and seven cars were wrecked, killing engineer, fireman and one brakeman. It is said that the fastening of the switch had been maliciously removed.

9th, 11 p. m., on Union Pacific, near Devil's Gate, Utah, a westbound freight ran into a great mass of snow which had just slid down the mountain, and the engine was badly wrecked. The engineer was scalded to death and the fireman and a brakeman injured. There was a furious snowstorm at the time.

14th, on Rio Grande Western, near Bingham Junction, Utah, engine and one car of a passenger train derailed by snow and overturned. Fireman injured.

22d, on New York, Ontario & Western, near Cornwall, N. Y., a freight train was derailed by a land slide, the engine and two cars being thrown down a bank. Engineer injured.

23d, on West Shore road, at Utica, N. Y., a flanging car was overturned by striking a plank crossing when it was not properly adjusted. The car caught fire and was soon burned up. A brakeman was injured.

And 12 others on 11 roads, involving 4 passengers and 8 freight and other trains.

UNEXPLAINED.

1st, on Illinois Central, at Toon's, Tenn., 5 cars of a construction train were derailed, killing 3 employees.

5th, on Kentucky & Indiana Bridge Co.'s road, in Louisville, Ky., the rear car of a passenger train was derailed at a curve and thrown off a trestle, killing the conductor and injuring a passenger.

7th, on Little Rock & Fort Smith, near Baring Cross,

Ark., an empty engine was derailed and overturned; engineer killed.

16th, 8 a. m., on Chicago, Milwaukee & St. Paul, near Westby, Wis., passenger train derailed and overturned, one car falling down a high bank. The wreck took fire, but the passengers all escaped. Thirteen passengers and 2 trainmen injured.

18th, on St. Louis & San Francisco, near Woolscys, Ark., passenger train derailed, injuring 8 passengers.

20th, on Union Pacific, near Maxwell, Wash., passenger train derailed, the engine and 5 cars being thrown into the ditch. Fireman killed and 2 other trainmen injured.

20th, on East Tennessee, Virginia & Georgia, at Williams Siding, Ga., a freight train was derailed and partially wrecked, severely injuring a brakeman.

21st, on Pittsburgh, Cincinnati, Chicago & St. Louis, near Woodville, Pa., the engine of a passenger train was derailed and overturned. Engineer injured.

22d, on Norfolk & Western, near St. Paul, Va., passenger train derailed; engineer killed and fireman injured.

22d, on Chicago, Rock Island & Pacific, at Blue Island, Ill., a westbound passenger train was derailed and ditched while running at moderate speed. Some of the stoves set fire to the cars, and the entire train was consumed, together with considerable mail matter. One passenger was killed and 7 injured.

29th, on Iowa Central, near Abingdon, Ill., a locomotive of a freight train in backing into a coal track was derailed and ditched, killing the engineer.

30th, on Pennsylvania, in Newark, N. J., the engine and 1 car of a freight train were derailed at a curve, slightly injuring a brakeman.

And 25 others on 21 roads, involving 6 passenger and 19 freight and other trains.

OTHER ACCIDENTS.

10th, on Pittsburgh, Cincinnati, Chicago & St. Louis at Sheridan, Pa., an oil tank car in a freight train was blown to pieces by an explosion, badly injuring a brakeman.

12th, on New York, New Haven & Hartford near Woodlawn Junction, N. Y., the engine of a passenger train was badly damaged by running against a derrick, used in the construction of a bridge near the track, which was out of place. The train was moving slowly at the time. An engineer at work on the bridge was badly injured.

17th, on Louisville & Nashville at Oxmoor, Ala., locomotive wrecked by the explosion of its boiler. Engineer and fireman killed.

30th, on Grand Trunk in the tunnel between Port Huron, Mich., and Sarnia, Ont., an eastbound freight train broke in two, necessitating the stopping of the train. The conductor and one brakeman were suffocated by the gas from the locomotive and both of them died.

And 8 others on 7 roads, involving 5 passenger and 3 freight and other trains.

A summary will be found in another column.

New Express Locomotives, Eastern Railroad of France.

The Eastern Railroad of France is constructing at its shops in Epernay, 12 express locomotives of a new type. The through service of this road from Calais to Basel requires close connections at the Swiss frontier, and the necessary speed at places is high, sometimes rising to 60 and 68 miles an hour. Since the number of trains is limited by the conditions of service in other countries, the weight of the trains is steadily increasing. During certain seasons of the year, the train load rises to 220 and 240 tons, including the weight of the engine and tender, and the number of the cars is then 18 to 20, including a sleeping car of a modified American type. In order to make the schedule time, two locomotives are required on the section between Chaumont and Belfort, and also between Troyes and Chaumont during unfavorable weather.

The use of assistant engines is considered undesirable for a number of reasons, and M. Salomon, Chief Engineer of Rolling Stock, and M. Flaman, Designing Engineer, have accordingly designed special locomotives for this service. From an article in *Le Génie Civil* it appears that they have adopted as leading features in these new engines a bogie truck, outside cylinders placed unusually far back, the location of the firebox between the axles of the driving wheels and a boiler in two parts.

Special attention has been paid to the latter parts of the locomotive, and the designs, due to M. Flaman, comprise a main barrel, completely filled with tubes, and a secondary cylinder, about 2.8 ft. in diameter, above this and connected with it by three large openings. The upper cylinder extends back over the firebox, which is exceptionally large for French locomotives, resulting, it is stated, in doubling the reserve power of the boiler, which is certainly a great advantage on steep grades if it proves to be the case in practice. The grate surface in these locomotives is nearly 26 sq. ft., and it is intended to use as fuel about 80 per cent. of coal "dust" and 20 per cent. of briquettes, according to the usual practice of the Eastern railroad. The firebox has a mean depth of 6.3 ft. and is 3.33 ft. wide. The top has a semi-circular transverse section and is formed of corrugated steel plates on the Fox system, so extensively used in the furnaces of marine engines. A water arch of the Ten Brinck type is also used. The heating surface of the firebox is 146 1/2 sq. ft. and that of the arch 24 1/2 sq. ft., making a total direct heating surface of nearly 171 sq. ft. There are 323 mild steel tubes 1.57 in. in diameter in the main barrel of the boiler, giving a total heating surface of 1,769 1/2 sq. ft. This makes a total heating surface, direct and indirect, of a little over 1,940 sq. ft.

The normal water level is at the axis of the upper cylinder, and when the water stands at this point the boiler contains about 217 cu. ft., leaving a space for steam of a little over 63 cu. ft. The water level can sink

so that the steam space is $122\frac{1}{2}$ cu. ft. before it becomes necessary to add a supply from the tanks.

The total wheel base of these locomotives, from the rear driver to the forward wheel of the truck, is 24.4 ft. The diameter of the cylinders is 19.68 in., and their stroke 25.92 in. The drivers are 6.25 ft. in diameter. The weight of the empty locomotive is 110,000 lbs.; when in service the weight is estimated at 123,000 lbs. The loaded tender weighs 95,000 lbs.

The first two locomotives of this type have been recently tested. On a long grade of 0.8 per cent., a train of 600 tons was pulled at the rate of 11.4 miles an hour, while trains of 230 to 240 tons were drawn at the rate of 47 miles an hour.

Greenlee's New Automatic Car Gaining Machine.

This car gainer is claimed by the manufacturers to be a machine which entirely overcomes the mechanical objections to the old style of machine as heretofore built and in addition is more powerful, quicker in reversing, handier to operate, and occupies less space. They claim as a very superior feature that only one belt is used for driving the head, which runs over idlers in the centre of the head-carriage and between the boxes on the mandrel shaft. One of the idlers is on a tension carriage which automatically adjusts the tension on the belt at all points of stroke or position of the head. Instead of feeding the head carriage by short belts, shifting them to reverse the stroke and having only one rate of feed, there is only one feed belt used, which runs from the counter shaft to a triple cone. From the cone shaft the power is transferred and multiplied by a steel worm and bronze gear. Thus are obtained three rates of feed with a positive and quick reverse. The feed mechanism reverses automatically and stops at the end of the return stroke. The stroke can be set to any position or length, covering a range of 22 ins.

The gaining head frame is counterbalanced, and has four stops. The lever is in the centre of the frame, is easy to reach and requires no adjustment. The vertical range of head is 14 ins. The timber carriage is framed of steel, to combine lightness with strength. It has movable screw clamps and a stopper operated by the foot treadle. The machine is furnished with a boring attachment, if desired.

Progress in Car Construction.

At the February meeting of the Western Railway Club a discussion of Mr. Barnes' paper on "Recent Progress in the Design and Construction of American Freight Cars," read at the previous meeting, was in order.

Mr. FORSYTH: Mr. Barnes has given a very good account of recent progress in car building. The interesting part of it to me is his reference to steel underframes. He shows that in order to get sufficient strength in the modern cars, the weight of the timber frame is greater than the equivalent strength in iron and steel. Now, in addition to its strength as an underframe, the steel would give a strong, continuous draft gear, for the drawbar attachments could be riveted directly to the steel beams and thus produce the strongest possible arrangement. He says that if steel sills were to be substituted for wooden centre sills, the result would be a decidedly stronger and more durable underframe and a continuous steel draft rigging. There would be no wood on the line of draft throughout the train. That to me is one of the interesting things in the paper.

President PECK: I believe that Mr. Barnes suggests that the sills be on the same line of draft that drawbar timbers now are, placing the drawbars between the centre sills and having them of steel. This has been tried by a great many roads in wood and has been very successful. The greatest objection to it in some cases is on account of the breaking of the sills. The cost of each renewal is so much, that though the number of breakages is much less, the cost of repairs is not diminished.

Mr. BARR: We have about forty steel cars of the Harvey design running on the road now, and up to the present time there have been no developments that would be of any interest whatever. I have given instructions to all my inspectors to make prompt report of any defects found in those cars, but so far have not received anything of any importance.

Mr. GIBBS: The whole paper would bear discussion by the members of this club. It shows the increased use of metal in the construction of portions of the car in which it has not heretofore been employed to any extent. It seems to me that there are parts of a car and trucks in which metal could be even more extensively used, as in the metal transoms and perhaps in the metal bolsters spoken of by Mr. Barnes. He mentions a composite bolster of metal and wood, but does not say how it is fastened together. I am not very sanguine that it will prove a success, particularly in the way he shows it, with the metal the same depth as the wood in the bol-

ster. The pressure of the load would fall on the narrow metal bars instead of on the broader surfaces afforded by the wood; and this, together with the modifications due to shrinkage, tend to destroy the unity of the bolster immediately.

Another very important point brought up in the paper read last month is the question of draft rigging. The brake tests that have been made recently, or at a more remote period, have shown the necessity of care in the draft rigging and attachments of all sorts. The form of draft rigging used by the Burlington road seems to me especially interesting, and I would like to know what success they have had with it; I refer to the form of construction in which drawbar passes through the end sill.

I doubt if we are sufficiently advanced to want a car all of metal. The paint, of course, is a small matter in itself, but it seems that the work of painting the metal will be a very serious matter. The paint will not stick unless the metal is scraped and prepared, which increases the cost. There would also be the greater cost of repairs when they are made. Certain repairs must be made in the life of any car, and though there may be less of them in the case of the metal car, they would be of a more expensive character than in the wooden car. The iron sheathing which is now used in some cars is not a success, because there is no satisfactory way of fastening it in place.

President PECK: Mr. Forsyth, you have quite a number of cars with drawbar passing through the end sill.

bolster, but we found much trouble in maintaining the truss rods.

Mr. BARR: I have had my attention called, in the past three or four months, to a lot of cars that are running over our road having composite bolsters. The wooden portion shrunk and caused a great deal of trouble by the side-bearings breaking on these two projecting plates of metal. That, of course, could be remedied by making the bars less than the bolster in depth.

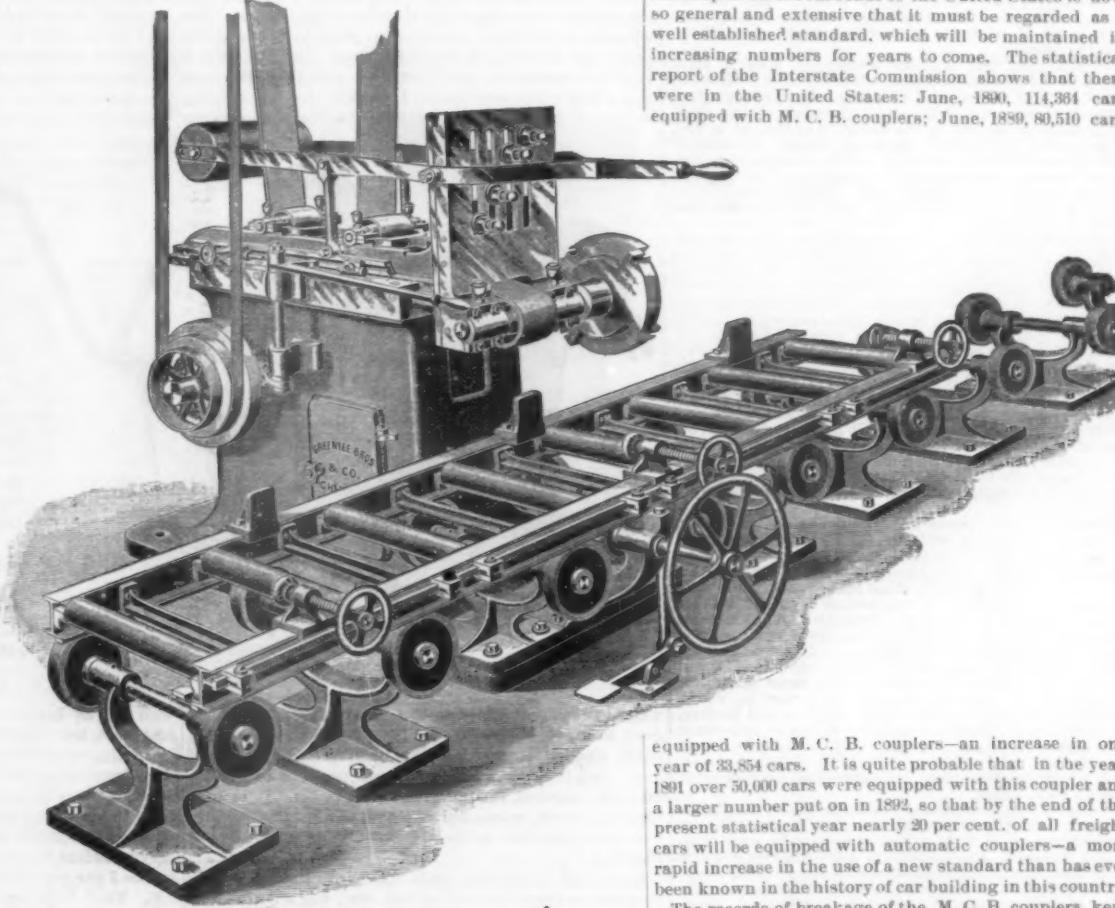
Mr. SCHROYER: In framing a composite bolster it is an error to make the depth of the plate the same as that of the timber. In our bolsters the centre-piece is rabbed on its edge to take the iron plate and the amount of the timber that remains on that centre on the bottom of the plate is $1\frac{1}{2}$ in.; the plate is 6 inches by $\frac{1}{4}$, and the timber is $7\frac{1}{2}$ inches deep.

Mr. BARR: The construction that we have adopted for our draft rigging is a practical continuance of the oak sill; that is, the two draft timbers are butted against an oak sub-sill of the same size, which is bolted to the centre of the car.

Mr. DOWNING: I would say that we had one of the Fox pressed steel trucks, and had it for the past eleven months, and it has shown no signs of wear or breaking. It has not cost us a cent. No rivets have come loose; in fact, nothing has happened to it.

The Strength of Car Couplers of the Master Car Builders' Type.*

The introduction of the Master Car Builders' form of car coupler on the railroads of the United States is now so general and extensive that it must be regarded as a well established standard, which will be maintained in increasing numbers for years to come. The statistical report of the Interstate Commission shows that there were in the United States: June, 1890, 114,361 cars equipped with M. C. B. couplers; June, 1891, 80,510 cars



AUTOMATIC CAR-GAINING MACHINE.

Designed and Manufactured by GREENLEE BROS. & CO., Chicago, U.S.A.

Probably you can enlighten the club as to the success of that arrangement.

Mr. FORSYTH: It must be borne in mind that those cars are all comparatively new, but we have thus far experienced no trouble with any part of that arrangement, either from the attachment of the draft rigging through the centre sills or from any weakness of the end sill. The end sill is strengthened by a beam, which is about as thick as the end sill itself, and which extends across the two centre sills, so that where the bracket of the drawbar comes in butting the depth of the timber is about double—in fact it is more than double—that of an ordinary car sill; therefore, instead of providing less material to resist butting we really have a great deal more.

In regard to Mr. Gibbs' criticism of the composite bolster, I may say that the tendency seems to be for the parts of the bolster to adjust themselves so as to equalize the strains in the timber and iron, each getting its own share. In practice we have had no trouble whatever with these composite bolsters. I believe that bolsters which are trussed have a very indefinite strength, because the compression of the wood at the ends of the truss rods, the shrinkage of the bolster, and the loosening of the parts of the truss, result in greatly lessening the value of the latter; and for this reason I have always preferred the composite bolster.

Mr. SCHROYER: We have found the composite bolster to be preferable to the trussed bolster. I do not consider that any trussing that could be put on a thing of that kind could be of any service unless the rods are put under initial tension sufficient to arch the bolster. I made some tests a short time ago. I found that the ordinary wooden bolsters, without any iron plates, under the load of 55,000 lbs., had a deflection of one-eighth of an inch. The same bolster, with the iron plate in it, sustained a load of 84,000 lbs., which proved conclusively to my mind that a composite bolster was very much better than the wooden bolster alone. When we discarded the plain wooden bolster we employed the truss

equipped with M. C. B. couplers—an increase in one year of 33,854 cars. It is quite probable that in the year 1891 over 50,000 cars were equipped with this coupler and a larger number put on in 1892, so that by the end of the present statistical year nearly 20 per cent. of all freight cars will be equipped with automatic couplers—a more rapid increase in the use of a new standard than has ever been known in the history of car building in this country.

The records of breakage of the M. C. B. couplers, kept for two years on the Chicago, Burlington & Quincy Railroad from October, 1890, to October, 1891, show that 7 per cent. of the couplers break annually, and of these 37 per cent. break in the arms; 24 per cent. of the knuckles break annually, 50 per cent. of them through the upper lugs. This is based on 1,184 cars equipped with M. C. B. couplers in 1890 and 9,205 cars in 1891. In the year 1891 we had replaced by one company 540 broken couplers and 2,400 broken knuckles.

It may be said that in spite of frequent failures that the bar is economically an improvement over the link and pin bar, because makers replace broken parts at small cost, and the cost of maintenance per year for material is now lower than when links were generally used. But the cost of drawbar material is a small part of the expense to railroads caused by trains breaking in two. It is a frequent cause of bad wrecks, in which both car bodies and trucks are damaged, the train delayed, and also those immediately following it.

Much of the damage to automatic couplers is due to the links in plain couplers striking them in switching, and this destruction will continue to increase until over 50 per cent. of all cars are equipped with the new bar. Another cause of great danger to the M. C. B. bar and knuckle is the reckless and improper use of the quick acting emergency brake. The air brake as now used cannot be said to be entirely advantageous. The recent tests at Burlington with the most perfect brakes now made, on a train entirely equipped with M. C. B. couplers, were seriously interrupted and delayed by the breakage of knuckles and bars. An illustration was also given of the effect of the emergency brake when a regular train broke in two and the front car was thrown against the engine, knocked off the truck, and the whole end sill and draft rigging destroyed.

There have been recently introduced in the House of Representatives four bills which in effect compel railroads to equip their cars with safety appliances, air brakes and automatic couplers, and it is quite probable that an act of this character will soon be passed. The demand for cheap couplers which is sure to follow will place on the market bars made of poor material and un-

* Extracts from a paper read by Mr. Wm. Forsyth, Mechanical Engineer C. B. & Q., before the Western Railway Club, February meeting.

fit for the purpose. The M. C. B. Association has already taken measures to devise rules for the inspection of air brakes before purchase, and the necessity of similar action for couplers is now apparent.

For nearly all iron and steel products used in such large quantities, railroad companies have in recent years formulated specifications and tests to be used in inspecting material, so that they may be reasonably certain that they are getting supplies of proper size and strength for the service required of them. Thus we have specifications for car axles, bar iron, steel for locomotive boilers, parallel rods, etc. For a detail which should be uniform in size and possess great resistance it has seemed to me that the M. C. B. coupler should be bought subject to inspection and tests.

I will not take up inspection by gauges, but will endeavor to present a preliminary study of that part of the proposed specification which relates to the strength of the coupler, considering first the strength of design and, second, the strength of material.

First.—The car coupler as now generally used performs two functions: It acts as a convenient mechanism for connecting one car with another, and as a buffer for resisting the shock when they come together. The M. C. B. form was selected as the most practical one for automatically performing the first function, but the experiments to determine the correctness of the designs when used as a buffer were not made under conditions as severe as subsequent service imposed, or I am sure the form would have been modified to a more natural one for resisting violent compressive blows. Any one designing a battering ram would not make it in the form of the letter U, with one leg presented sideways to receive the blow.

The cast iron link coupler developed into a form known as a bull-nose, a name which carries with it the idea of butting rather than coupling. In it, a large mass of material surrounded the small opening of the link. The prominent feature of the design was that of a ram, the provision for the link seeming almost incidental. Notwithstanding this strength of the design, the link coupler breaks more frequently than any other casting in a car, and this fact should have pointed out the necessity of great strength in any new design which was to take its place.

Buffer blocks at each side of a link coupler, though not a desirable thing for the safety of trainmen, are a great protection to the coupler. This is shown by the fact that where they are used it has been found possible to make wrought iron drawbar, suitable for link connections, which does not break often and which weighs not more than from 40 to 75 lbs. (See fig. 1.) The advantage of buffers is so great that they are largely used with link couplers, notwithstanding the danger to the men who have to go between the cars to adjust the link and pin. With automatic couplers, where this danger to the men is removed, it is strange that the protecting buffers have also disappeared. When the coupler became an organized structure with its weak points in bar and knuckle and pin, it then needed more than ever the protection of the buffer, so that its function should be only that of a coupler, and not that of a combined coupler and buffer.

I have for several years advocated the use of spring buffers in connection with the M. C. B. coupler, but a practical device for the purpose has not yet been introduced, and it will be necessary to make a start in this direction and demonstrate their real economy notwithstanding the extra cost. I am aware that the buffers would be useless if cars came together with knuckles closed, and couplers should be arranged so that when unlocked the knuckle will always stand open. Several coupler companies now claim to accomplish this, but they are not uniformly successful; we must accept for the present the general practice as it now is, which compels couplers to act both as couplers and buffers. The necessity of this duplex quality seems so important in the minds of some, that one of the bills before Congress already referred to (the Milliken Bill) has a provision which requires that "the standard coupler must act as its own buffer."

Second.—Having discussed the shape of the coupler in its relation to frequent breakages, I will now take up the resistance of M. C. B. couplers to tensile and compression stresses. Some couplers are admittedly weak in both directions, and a specification for M. C. B. couplers should provide for tests which will measure the pulling resistance, as well as to blows delivered somewhat like that when two cars are thrown in violent contact.

To get necessary data for such a specification it is necessary to test couplers of various makes in each way, and see what is the maximum that may be expected. In conducting such tests at Aurora we have two pieces of testing apparatus adequate for the heavy work required; a Riehle testing machine, made for testing large bridge rods, having a capacity of 200,000 lbs., and an axle testing machine having a drop weight of 1,640 lbs., with a maximum fall of 30 ft. We have already made a number of tests of M. C. B. couplers on these machines, and I will give some of the results.

In the tensile machine two couplers of the same kind were pulled against each other, and Tables I and II give the result of a few of these tests:

TABLE I.—TENSILE RESISTANCE OF MALLEABLE COUPLERS.

Date.	Type.	Ultimate Strength.	Location of Fracture.
1888..	A	80,000 lbs.	In bar at bottom lug.
1888..	A	89,600 "	In wrought-iron knuckle tongue 2 in. from end.
1889..	B	102,000 "	In bar at lug.
1891..	B	112,000 "	In bar at lug.
1892..	C	90,000 "	In steel knuckle.
1892..	E	121,000 "	In steel knuckle.

NOTE.—The average of six malleable bars, and including four different kinds, was less than 100,000 lbs., and one-half of the bars were broken.

TABLE II.—TENSILE RESISTANCE OF STEEL COUPLERS.

Date.	Type.	Ultimate strength.	Location of fracture.
1892..	F	105,800 lbs.	Knuckle broken.
1891..	H	148,600 "	Knuckle broken.
1892..	D	98,200 "	Knuckle broken.
1892..	I	122,200 "	Knuckle broken.
1892..	I	108,100 "	Knuckle broken.

NOTE.—The average strength was 116,300 lbs. None of the steel bars were broken, but all failed in the knuckles.

The strength of the material in wrought iron knuckles is not as great as the bar iron from which they are formed. Broken knuckles of this kind are invariably coarsely crystalline. I had a tensile test piece made out

of one of these knuckles, and found the ultimate strength to be 48,800 lbs.; elastic limit, 27,300 lbs.; elongation, 15 per cent. in 2 ins.

[TO BE CONTINUED.]

Portable Electric Drill.

The illustration shows a small truck on which is mounted an electric motor for working a drill with a suitable length of cable, which was devised and is made at the works of the Allegemeine Electricitäts Gesellschaft, in Berlin, where it is in constant use.

This company has for some time been giving attention to the utilization of electric motors for working small tools in machine shops, as well as for operating a complete section or group of tools; so that instead of employing long lengths of countershafting or a number of small steam engines for the different departments, mechanical energy is obtained from one central source for all kinds of work by means of highly efficient electric motors and extremely flexible connections.

This portable drilling machine consists of a light two-wheeled truck carrying the electric motor, with a resistance box underneath it for adjusting the power employed, while the flexible wires or cable for connecting the motor to the nearest fixed point of the electric light wires in the building may be seen wound upon a frame ready for unwinding when required. On the motor spindle is mounted a small grooved pulley which gears into a larger similarly grooved pulley, the latter being thrown in or out of gear by means of a lever and counter-

more trouble than they save. There are other schemes, but the great flexibility of electric wires and cables offers the easiest way out of the difficulty, since small portable tools may be moved about, with hardly any trouble, all over a shop, the only connections to a fixed position being a couple of wires which can be slung up out of the way, or even allowed to lie on the floor and be trodden upon with comparative impunity.

The City & South London Railway.

BY M. A. M. SOC. C. E.

I am now able to give you the detailed figures referred to in my communication of two weeks ago [Railroad Gazette, Feb. 19, p. 140]. In the table below are given the result of the working of this line for the half year ending Dec. 31, 1891. Alongside are the figures for the previous half year, as given in the Railroad Gazette of Dec. 11, 1891, except that in four instances the figures thus given were in error, and have been corrected, indicated by a †.

For one-third of the half year season tickets have been issued and in computing the number of passengers there have been added 32,300 for those commuters who are probably all of the kind which makes two journeys daily, and 100 journeys each have been allowed. All the calculations include these 32,300 journeys.

The mean result of the new policy of charging only one penny fares at certain stations during certain slack hours when every train is loaded to its utmost, has been to in-

crease the number of passengers about 15 per cent. and to reduce the mean fare from four to three and a half cents per passenger.

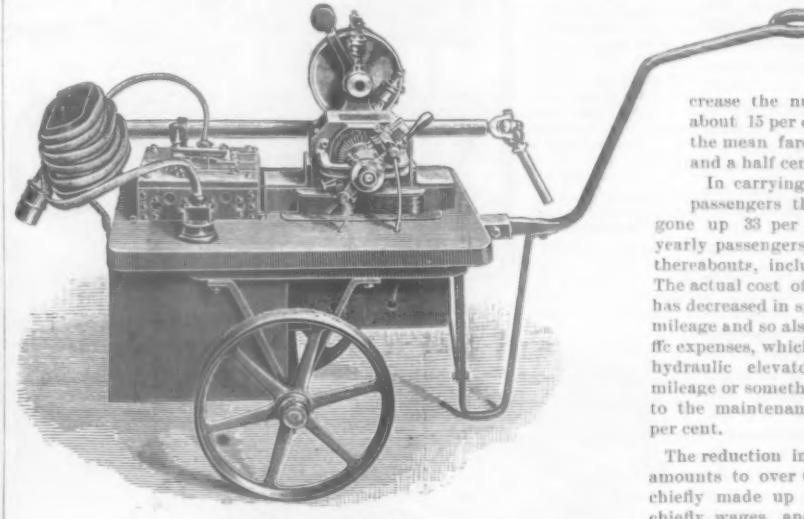
In carrying 15 per cent. more passengers the train mileage has gone up 33 per cent., bringing the yearly passengers up to 5,382,000 or thereabouts, including season tickets. The actual cost of the motive power has decreased in spite of the increased mileage and so also have general traffic expenses, which include that of the hydraulic elevators, but increased mileage or something else has added to the maintenance of track nearly 30 per cent.

The reduction in the motive power amounts to over 6 per cent., and is chiefly made up of reduced repairs, chiefly wages, and reduced wages in the engineering departments generally, but directors are as numerous and

well paid as before though clerks get less. Fuel, too, costs less, but whether because of cheapness or improved insulating or electrical efficiency is not shown. In spite of reduced wages all round there is only a balance of \$4,282 to carry forward, and of this \$2,777 came forward from the previous account, so there is again no dividend on the \$3,150,000 of ordinary stock, the net income being only sufficient to pay the interest on the \$46,310 of preference 5 per cent. stock and on the \$88,000 of loan capital. That is to say, three-fourths of the capital goes without interest. The most satisfactory items are the mileage of the motors, and the general cost of motive power per train mile, which has fallen off very much from that of the previous half year and cannot be considered heavy for an electric line, even though the trains are so very light.

There are still 46½ passengers per train journey, but as the fares are paid in cash, and passengers get off where they please, there is no telling the passenger mileage. The majority are probably travelers to the end or near the end of the line, and few probably travel less than half the length of the line per journey. The rate per mile per passenger cannot, therefore, be known, but it may be roughly guessed at one and a half cents per mile or even less.

Two facts present themselves for consideration. One is that the busy period trains still fill at an advance fare of 50 per cent. above the original. This means that every train carries at such times of 6 cent fares at least 120 passengers, exclusive of any who may be standing, and we believe these are numerous. At 120 per train all day through the receipts would be increased fully 2½ times, even with the present midday lower fares. There would be \$152,000 more to pay interest on the three million odd dollars of ordinary capital. This is practically 5 per cent. Now it is beyond all reason to expect that the trains can be filled the day through. It will therefore be impossible to pay 5 per cent. on ordinary shares until the traffic assumes such proportions that the low midday fares can be raised, and every seat still filled on the route of this subway. This is very improbable, for in the above the expenditure is supposed not to increase. The reduction in the ratio of expenditure to gross receipts down to the steam railway ratio of 50 per cent. would, roughly, only set free \$27,000, or equal to less than 1 per cent. dividend, and altogether the prospect of dividend is not brilliant. This is not the fault of the motive power, but of the structural cost, or of such



A Portable Electric Drill.

causes as have watered this cost to the enormous total of one and one-third million dollars per mile. The question might well be asked, where has the money gone? It is impossible to think it can have been expended at the rate of \$379 per yard of single 10-ft tunnel, though on this point New York may well be curious, with the same system held out and advocated there for rapid transit. At ten dollars per inch for a double line, that is, for a trifle under one-half the cost of the London line, the way of this type might perhaps pay a small interest of 2 or 3 per cent. on capital, but a rate of seven dollars per inch would be more hopeful. The working stock of the railway only cost about \$160,000, not a heavy item. Until some explanation of abnormal cost in the specially favorable sub-soil of London is laid before the public of New York, it is not to be reasonably expected that a deeply buried subway will be entered upon when it has no advantages and many disadvantages as compared with a near surface road.

The latest intent of the company is to make a footway connecting with the London Bridge Station of the Brighton line, with the idea of thus taking the passengers from the line into the city—the Brighton line ending as it does on the South Bank, having special disadvantages for city men who do not like the crowded crossing of London Bridge.

The same parliamentary bill also asks power to construct two additional tunnels under the river with easy inclines to a central station under Lombard street corner, and thence under Moorgate street and City Road to the Angel Inn at Islington, where room for sidings can, it is said, be had for small cost. It will be interesting to learn the cost per mile of the new proposal, and compare it with the cost of originally promoted line.

HALF YEAR ENDING DEC. 31, 1891.

Basis, \$1 = \$5.

	Half year Dec. 31, 1891.	Previous half year.
Miles open for traffic	3 m. 12 c.	3 m. 12 c.
Capital cost, including equipment	\$4,202,010	\$4,106,764
Number of ordinary passengers	2,749,655	2,412,343
Number of season-ticket holders	325	None.
Total receipts	\$101,210	\$98,187
Of which:		
Ordinary passengers	97,751	97,016
Season tickets	1,243	,000
Parcels	130	1½
Fees and rents	2,198	1,169
Expenditure	77,582	77,004
Cost per mile	1,333,996	1,363,736
Train mileage	188,666	111,408
Receipts from passengers per train mile	\$0.525	\$0.686
Expenditure per train mile	0.411	0.548
Net return per train mile	0.114	0.138
Passengers per train mile	14.7	17
Receipts per passenger	\$0.036	\$0.0402
Proportion of expenditure to revenue	76% ⁵	78% ⁵
Cost of motive power	\$30,998	\$32,936
Ratio of cost of motive power to total expenditure	40%	42% ⁶
Train miles per day at 180 days per half year	1,048	785
No. daily journeys	330	251
Mean headway, say 18 hours per day	6½ min.	9 min.
Total train journeys per half year	59,595	45,000
No. of passengers per journey	46½	53½
Cost of motive power per train mile	16.1 cts.	23 cts
Maintenance of way per mile	8779	\$315 ⁴
Carriage repairs per mile	579	571 ⁴
Maintenance of way per train mile	0.013	0.0137
Cost of motive power per passenger	0.0111	0.0136
Traffic charges, including hydraulic elevators	31,847	32,040
Per train mile	0.169	0.226
" passenger	0.0114	0.0133
Directors' fees per train mile	0.017	0.023
" passenger	0.0017	0.0013
Ratio of directors' fees to receipts	3½	3½
No. of elevators per mile	3.8	3.8
" passengers per elevator	231,779	201,028
" carriages	36	30
" motors	15	14
" per mile	4.44	4.44
Average mileage per motor	13,476	10,101
Train mileage per mile of line	59,896	44,891
Earnings per motor per half year	\$7,230	\$7,000 ⁷
Earnings per mile of line	32,182	31,000

⁵ Signifies wherein the last figures of Dec. 31, 1891, were erroneous and have been corrected.

Improved Suburban Car Seat.

The Forney seat, shown by the accompanying illustration, is one of the most popular with suburban passengers that has been used in the vicinity of Chicago. It is the well-known type, but is covered with rattan. It is made by the Scarritt Furniture Co. of St. Louis, and is known as the No. 45 rattan coach seat. It is used in the latest Chicago, Burlington & Quincy suburban coaches, and in connection with the other improvements in those cars makes them very satisfactory to the patrons of the road. The coach improvements in general are light colored ceilings, brilliant oil lamps, clean floors, commodious and continuous package racks along the sides of the cars, steam heat, etc.

Annual Report of Minnesota Railroad Commissioners.

The report of Messrs. George L. Becker, John P. Williams and William M. Liggett, railroad and warehouse commissioners of Minnesota, for the year ending Nov. 30, 1891, has just been issued, the statistics being for the year ending June 30. The commission has adopted the national form of report and it is stated that the companies generally respond in a reasonable manner, but the Great Northern neglects to report the cost of road and equipment in Minnesota and the number of tons of freight moved in Minnesota. Several roads are somewhat dilatory and a law requiring the returns to be in before Sept. 15 is recommended.

The number of miles of road in the state on June 30

was 5,528, an increase of 119 since the previous year. The Winona & Southwestern constitutes 96 miles of this increase. The ton mileage in Minnesota for the year was 1,768½ millions, a considerable decrease from the year ending June 30, 1890. The passenger mileage was 249½ millions, an increase of about 10 millions. The average rate per ton per mile on freight in Minnesota was 1.16 cents, an increase of .15 cent. The average rate per passenger mile was 2.37 cents, the same as the previous year.

The earnings, within the state of Minnesota, of the roads reporting, aggregate as follows:

EARNINGS, EXPENSES AND NET INCOME.		
Year ending	Year ending	Increase.
Gross earnings. June 30, 1890.	\$20,626,760	\$19,719,719
Freight	6,034,445	5,617,055
Passenger	2,059,833	1,856,354
Miscellaneous		203,459
Total	\$28,721,658	\$27,193,108
Op. exp.	17,568,812	16,311,062
Net earnings	\$11,152,246	\$10,882,106
		\$270,140

The casualties to persons in Minnesota for the year were as follows: Killed; passengers, 1, employees, 44, others (trespassers, 57, not trespassers, 13), 70, total 115. Injured; Passengers, 48, employees, 415, others (trespassers, 30, not trespassers, 30), 60, total, 52. Thirty-two injuries to passengers were caused by train accidents; the one death and sixteen other injuries were from other causes, chiefly at stations. The number of employees killed in coupling and uncoupling was 14, and of injured 134.



Forney Seat for Suburban Cars.

Made by the SCARRITT FURNITURE CO., St. Louis, Mo.

Reference is made to the recent decision of the State Supreme Court in the sleeping car case and the United States Supreme Court in the milk rates case. These necessitated changes in the laws, and some of these have been made. The commission will recommend further modifications. The new laws already made are printed in the appendix, but this appendix, which also includes the detailed reports of the companies, is not yet printed.

The controversies that have come before the commission during the year are reported at length, those connected with the country elevators and the grain business at country stations constituting the principal share of the matters reported upon.

The report says that "Notwithstanding the enormous crops produced in this state in 1891, and the consequent increased demand for shipping facilities, there has been less complaint of lack of cars than in any previous year since the commission was established. The companies have fairly met the demands made upon them in this respect. The practical rule laid down by the statute for distribution of cars, when the demand exceeds the supply, has been observed and the result has been in the main satisfactory to shippers."

The number of employés in the State is reported as 20,101, an increase of 922 over the previous year. The Commissioners, like those of many other states, make a plea for more power, but it is a quite modest plea.

The Chicago Elevated Terminal Railway Company's Union Station.

Architect S. S. Beman has about completed the plans for a magnificent station which the Chicago Elevated Terminal Railway Company proposes to erect at the corner of State and Twelfth streets. The main building will be eight stories high, surmounted by a steep tiled roof, and will have a frontage of 350 ft. on State street.

The style of architecture is English renaissance. Just 80 ft. south of this main building a trainshed fronting 1,000 ft. on State street is proposed. A conspicuous feature of the station will be the tower. This will be immediately on the corner, and will be 60 ft. square and 420 ft. high to the top of the flagstaff. In the tower there will be a large clock, with dials on each side 19 ft. in diameter, while at the top there will be an immense frieze about 16 ft. wide emblematical of railroad construction.

The first and second stories of the exterior will be of stone, and above this the walls will be of terra cotta.

There will be two entrances to the main waiting room from State street and two through the tower, while the passengers for suburban trains will reach the trains from the south end of the main building through the court between the latter and the trainshed.

The fronts of the ground or first story of both the main building and trainshed will be occupied as stores, with the exception of the space used for the entrances. The main waiting room will be 174 x 350 ft., with arched ceiling and a skylight overhead, this being the size of the court by which the offices above will be lighted. Off this room there will be a suburban waiting room 50 x 100 ft., ladies' parlor 50 x 80 ft., with dining-rooms, barber shop, news stands, etc.

Off the main waiting room will be a loggia 18 ft. wide and about 130 ft. long, while beneath this will be a carriage entrance to the elevators and steps leading up to the general waiting room. This carriage court will be 150 x 50 ft. The upper part of the building, including the tower, will be divided into offices, of which there will be 106 on each floor. Across the covered court between the main building and the trainshed will be 14 tracks, arranged by means of transfer tables so that the trains moving can be immediately transferred from one track to another and can arrive and depart continuously without interruption. At the north end of the shed there will be eight elevators, for receiving and lowering to the baggage rooms beneath the baggage from incoming trains, while at the south end there will be the same number for handling outgoing baggage.

The steel roof trusses of the trainshed will have a clear span of 289 ft. and will be of elliptical form and rise to a height of 125 ft. They will be placed 40 ft. apart and arranged in pairs, braced and riveted together. The platforms of the trainshed will be of Portland cement, and tracks will be 12 in. below the platform levels.

The entire structure will be of fireproof construction, with mosaic floors, with all the best modern conveniences. The estimated cost is placed at \$3,500,000. It is hoped to begin work as early as April, and it is thought that two years will be required to complete it. It is only proper to add that the financial and business arrangements for carrying out this great scheme are still far from complete.

THE SCRAP HEAP.

Lake Freights on ore for Twenty Years.

The *Marine Review* prints a table from which the following is abstracted, showing the contract rates paid for freighting iron ore from the ports mentioned to Lake Erie ports.

	Total Gross tons	Contract rates		
		Escanaba.	Marquette.	Ashland.
1872	948,553	\$2.00	\$2.80	
1873	1,195,234	2.60	2.50	
1874	809,934	2.60	2.75	
1875	881,165	1.40	1.75	
1876	993,311	1.20	1.50	
1877	1,025,129	1.00	1.40	
1878	1,111,110	.90	1.30	
1879	1,375,691	.90	1.40	
1880	1,906,745	1.85	2.75	
1881	2,307,006	1.75	2.45	
1882	2,965,412	1.40	1.75	
1883	2,352,840	1.00	1.20	
1884	2,508,603	1.10	1.35	
1885	2,516,642	.90	1.65	1.15
1886	3,559,371	1.05	1.20	1.20
1887	4,742,276	1.10	1.65	2.00
1888	5,016,503	.90	1.15	1.25
1889	7,292,644	1.00	1.10	1.25
1890	9,003,701	1.10	1.25	1.35
1891	7,011,933	.65	.90	1.00

Shipments from the Gogebic mines, at Ashland, were unimportant until 1885. Rates from Two Harbors, Vermilion mines, are the same as from Ashland. The *Review* gives also the "wild rates," i.e. the rates received by vessels chartered for a single trip. These rates for Escanaba averaged for the 20 years \$1.20⁵, as against \$1.30⁵ for contracts. From Marquette the wild rates averaged \$1.70 and the contract rates one cent more. From Ashland, for seven years, the wild rates were \$1.47 and the contract rates 10 cents less. Until September 1881 the traffic from Lake Superior passed through the old locks at the "Soo;" that is there were two locks, one above the other, with 11½ ft. on their miter sills and after September, 1881, there was a lock of single lift with 17 ft. on the miter sills, and three years after that only 11 per cent. of the tonnage passing through the canal could have used the old locks. In comparing the freight rates from Marquette for the two periods we find that the average contract freight to and including 1881 was \$2.16 and for the 10 years commencing with 1882 the average freight was \$1.26⁵, or a decrease of 41.44 per cent., while from Escanaba the contract freight rates averaged \$1.50 and \$1.05 for the two periods, showing a fall of 32.69 per cent. Two causes have operated to reduce the freights from Escanaba; of the 39½ million tons of ore shipped, 47 million tons, or nearly 80 per cent., have been shipped in the last ten-year period. This larger business would have reduced the cost of service unless the waterways had been gorged. The fact that larger vessels could go to either port increased the relative number of large carriers, and this in turn reduced the freight rates.

German Pig Iron Production.

The production of pig iron for 1891 in the German Empire, including Luxemburg, was 4,452,019 metric tons of 2,205 lbs., as against 4,563,025 tons in 1890, or a decrease of about 2½ per cent., as compared with 8 per cent. in Great Britain and 9 per cent. here for the same time. As in this country, the German production seems to have increased at the end of the year, their make for December last having been 25,358 tons greater than in 1890.

The Perils of the Deep.

A London correspondent says: "The *Railroad Gazette* of Jan. 22 was only delivered in England on Feb. 6. As some of the copies were slightly wet and the delay was nearly a week beyond the usual Monday morning's post, it is likely they had been in the 'Eider,' which was wrecked off the Isle of Wight, and much of the mail was recovered by divers."



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in our journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

On another page will be found a letter from the New York Air Brake Co., covering a report of some release tests made by that company, on the Lehigh Valley Railroad, with the New York valve. It is said that the valves were "duplicates of the first but had received proper care in manufacture." Everybody must regret that tests were not made at the same time, with the same valves, for all their functions.

The decision of the United States Court at Springfield, Ill., in the case against Milton Knight, General Freight Agent of the Wabash and J. M. B. Kehlor, of Kehlor Brothers, sustains the demurmer to the indictments. In other words, the court refuses to take jurisdiction over rates to Canada. In the absence of the text of the decision, we cannot discuss the reasoning involved; but the practical difficulty of taking jurisdiction outside of the sphere of your own authority ought to be apparent to everyone. The same sort of case was constantly coming up, when state legislatures tried to control interstate commerce, and the decisions were generally in line with that in the present case. It was indeed held that discrimination between state and interstate traffic might sometimes be prohibited; but this was chiefly because discrimination was something more than a statutory offense. The authority of a statute extends no further than the authority of the legislature that passes it. Under these circumstances, it seems futile to ask Congress to remedy the difficulty by amendments to the Interstate Commerce Act. Any effectual control must be the result either of an agreement between the United States and Canada, or an agreement between United States railroads and Canadian railroads. The latter seems the more practicable alternative. We should probably have had something of the sort before this had it not been for the operation of the pooling clause of the Interstate Commerce Act. We are inclined to think that the chief outcome of the present decision may be to weaken what there is left of public sentiment against pools; because the decision will show that pools may be a necessary means of protecting American consignees as well as American carriers against foreign competition, otherwise uncontrollable.

The national law on couplers and brakes proposed by Mr. Crocker, which is summarized in another column, is the best and most moderate yet brought out, though it is not without its defects, the chief one being that it does not provide for uniformity in brakes. Mr. Crocker doubtless assumes, and quite likely a good many railroad men have agreed with him, that the universal brake is to be the Westinghouse automatic, or at least that it will be that brake with some one or more others that will work in the same train with it; but uniformity of action, when

spoken of concerning two different patterns of brake apparatus, is a delicate question, and it may remain an important question for some time to come. The difference between real uniformity and spurious or partial uniformity is not easily detected. Complete uniformity throughout the country is perhaps not so absolutely essential in brakes as in couplers, but past experience warrants the assertion, nevertheless, that, with brakes as with couplers, a law which does not prescribe national uniformity is more likely to postpone than to hasten the day when that uniformity will become an accomplished fact. In couplers, Mr. Crocker has doubtless taken the most sensible course that could be taken to get uniformity by law. He will secure uniformity if he secures anything. In this his bill is better than the best one previously presented, that of Mr. Rogers, reported in the *Railroad Gazette* of January 22. The latter left the field clear for a link-and-pin coupler on any road, provided its promoters could induce some authority to call it automatic. Mr. Crocker's dates are two or three years later than Mr. Rogers'. His penalty for non-compliance, found in the last paragraph, is moderate, while at the same time it would doubtless prove more effectual than the customary provisions on this point. It is to be hoped that the zeal of Congressmen to pass some kind of a law will not lead them to add to Mr. Crocker's bill any of the mischievous paragraphs proposed in bills heretofore presented, especially those which provide for action which is almost sure to be vitiated by political considerations. But, as we have heretofore said, the best thing to do with even the best bills is to lay them all on the table. The difficulties connected with the construction and enforcement of a good law seem to be increasing rather than decreasing.

Orders have been issued on the "Vanderbilt lines" designed to insure the proper operation of air brakes in freight trains. It substance the orders are that air-braked cars shall be examined by the inspectors to determine whether they are fitted with the Westinghouse, or with some other brake. In case the brake is not the Westinghouse an "odd brake" card shall be attached to the car and the air cut out. The necessity for some such action is becoming more and more apparent as the use of the air brake extends. For instance, recent tests of one style of triple valve that has been put into use on a considerable number of cars showed that it is not only defective in graduation, but destroys the graduating qualities of the Westinghouse when mixed with it. The construction of another style of triple is such that it is liable to give an emergency application when a service application is intended. One such defective valve introduced in a Westinghouse train would cause the emergency action of all the triples in the train, and thus again prevent the use of the graduating qualities of the Westinghouse brake. It is thus found in practice that brakes that are supposed to be perfectly interchangeable with the Westinghouse may seriously interfere with the action of that brake either through faults of principle or of workmanship. This is merely the practical demonstration of what we have often said, that it is a grave mistake to equip cars with brakes the operative efficiency of which has not been developed and proved in service on the assumption that the character of their performance when new may be relied upon to continue in service, and that, even if they do not work perfectly they will not do any harm when they are scattered through trains equipped with brakes that are reliable. There is, however, a practical difficulty in carrying out such an order. It is not always easy on a quick inspection to tell one triple valve from another. To get over this it is proposed to stencil on cars not only the words "air brake," but the name of the air brake. This will be done at once, we believe, on the New York Central & Hudson River, and we do not see how any maker of air brakes can object to it. If his brake is a good one he ought to be glad to get the advertisement; if it is a bad one the sooner he finds it out the better for him and every one else.

Signaling for 100 Miles per Hour.

The gist of Mr. Ely's conclusion, in his paper on high speed, which we have noticed in another article, is that his department can make as fast an engine as any superintendent can ask for; that he can make a machine to run 100 miles an hour before the superintendent can provide a safe road for it to travel on. While, in a general way we may all agree with this, it is nevertheless true that the provision of the required safeguards is only a matter of expense, after all. The principles of safe signaling do not interpose any obstacle to placing signals very much nearer together than the limit set by Mr. Ely, for they do not forbid the overlapping of caution signals, although it is true

that few roads could afford the money to properly signal 1,000 miles, or even 100 miles, in the way required.

It should be borne in mind, that with all our tremendous ambition—on paper—to travel at 100 miles an hour, it will be a long time yet before any road will wish to run more than one or two trains a day at that rate, and to do that it will only be necessary to block trains two stations apart and electrically lock the switches at the station which, for the time being, becomes the middle of a section.

A B C D E

A gives a clear signal only after he knows that the line is clear to C, and B gives clear only after learning that the line is clear to D. This involves special instructions to the runner, and a special quality of brains in the runner's head, but people who must reach Chicago in ten hours will, of course, be able to pay for such extras. To run all trains at such speed that they could not stop within 3,900 ft. would involve placing all distant signals 3,900 ft. from the corresponding home signal, but this would not necessitate block sections of that length, or of any particular length. Home signals every 500 ft. or every 100 ft. would keep trains that distance apart, if each had its distant signal 3,900 ft. back.

The automatic block signals on Mr. Ely's own road would very fairly illustrate the principle involved if the green blade were placed two sections back instead of one. With non-automatic signals a runner would have to run at cautionary speed past one or more caution signals which told him to run at full speed, unless each operator had control over the other caution signals between him and his particular caution signal, but that would not be difficult to arrange. The objections incident to overlapping will have to be obviated some time, even if the home signal has to be radically changed, for block sections shorter than the distance required to stop a train will become a necessity on some busy pieces of road. "The distant signal tells the runner that he must stop; the home signal simply tells him where he must stop." It must not be forgotten that this is a true cardinal principle.

The worst difficulty, however, and the one which most fully sustains Mr. Ely's position, is that signals specially arranged for trains running 100 miles an hour will hamper those running at 50 miles an hour, so that, theoretically, he will well maintain the point. But he had better hurry up with his 8-ft. driver engine, for in practice the superintendents will get around the theories "as quick as a wink." They will continue to use caution signals at the ordinary distance, say, 1,500 ft., and depend upon the ability of the runner to cover the additional 2,400 ft. with his long range eye. This will necessitate, if they continue to make safety paramount, much losing of time when the weather is not clear; but a fast schedule makes a quite satisfactory advertisement, even if it is accomplished only on fair days.

The Intercontinental Railroad.

In the March Forum is an article on "The Intercontinental Railroad Problem," by Mr. Courtenay de Kalb. By the intercontinental railroad, Mr. De Kalb means some line to connect the existing railroad systems of North and South America. The article begins with the statement that, "if constructed, it will secure to the United States the commercial supremacy of the world;" and the last words are, "our trade and finance will command resources through its agency which, combined with our native riches, will render America supreme in the money markets of the world." Now these two statements are immensely "important if true;" but between them "a great gulf is fixed," and the man who undertakes to bridge the gulf has a big job on hand.

We are bound to say that the job has proved too big for Mr. De Kalb. Yet he has travelled much in South America, and is a constant student of the affairs of the Spanish American countries; he is a man of scientific training, and a good observer. But he fails to give us any estimate of the cost of the proposed intercontinental line, or of the business that it could get. He tells us, it is true, that "only 2,000 miles in such a line remain unoccupied by existing roads and concessions," but how much of the rest is existing roads and how much concessions he does not tell us; nor what kind of a world, physical and social, lies in the gaps that go to make up that 2,000 miles. He leaves us with the general impression that there are now in South America 15,000 miles of railroad, all of which except the Argentine system, lies close to the coast; that the trade between the States is really insignificant and that the import and export trade is very well provided for; and, finally, that a great north and

south system must live rather by creating new trade than by diverting the old.

In truth the inadequacy of Mr. De Kalb's article is in the nature of things. No one in the world knows enough of the topography of the countries to be crossed and of the conditions under which construction must be carried on to even guess at the cost of filling up the great gaps in the existing lines. To get a few facts bearing on this part of the subject is what the surveying parties are now in the field for. Any estimate of the commerce that could be turned from its present channels, or that could be created, is speculative. So nobody can treat the subject except by inconclusive generalities.

But it will probably occur to anyone who thinks a little that the importance of the enterprise may easily be exaggerated. In the first place, supposing we could attract a large share of the South American trade, how much of it would go by rail? In the second place, with the best facilities for communication how much of that trade could we get? Probably far the greatest part of South America's foreign trade will always go by sea whatever continent it goes to. Mr. De Kalb himself shows that from the port of Cartagena to Chicago is 3,000 miles via New York (sea and rail) and 3,200 miles via Mexico (all-rail), and it is only when he gets as far south and west as Kansas City that he finds it 60 miles shorter to go by Mexico than by New York. But even between Kansas City and Cartagena commerce will find a far shorter route by sea through the Gulf ports than by any all-rail line. We will not stop to apply the same kind of analysis to the more southerly parts of South America, but it would give some instructive results. But time and distance are only two of the elements that fix the course of commerce. Cost is a more important one, and in this element the ocean routes will always have commanding advantages. Mr. De Kalb cites the cases of successful competition of railroads with lake and river routes in the United States, but the analogy is not very close. A better example would be the case of the transcontinental railroads, which abate the competition of the Pacific Mail by a yearly subsidy. Back of all this is our second question: How much of the South American trade should we get, even with the best facilities of communication? This takes us on to ground so difficult and so hotly disputed that we shall venture no answer.

The Limits of Railroad Speed.

Scribner's Magazine for March contains three papers on the limits of speed of railroad trains. Mr. Theodore N. Ely, General Superintendent of Motive Power Pennsylvania Railroad, writes under the title, "Train Speed a Question of Transportation," and reaches the essence of the subject in the last sentence. He says: "It is fair, therefore, we think, to rest the burden upon the transportation shoulders and predict that with it, and it alone, lies the practical limit of the speed of railway trains drawn by steam locomotives." This ground is well explained in what he has written, and his conclusions flow properly from his argument, which is based upon the practical conditions of train service.

One paragraph relating to the long distances through which a train must run with any ordinary braking power before it can be stopped from a high speed should call the attention of those who are running trains at 80 and 90 miles per hour to the dangers which such speeds induce. We quote the paragraph here as a clear exposition of a decidedly important matter. Referring to necessary improvements in locomotives and permanent way, he says:

The above conditions have been cited in detail to show that they all must be fulfilled in order to make possible our future traveling at the rate of 100 miles an hour. Make possible, yes, but only upon the fulfillment of one other condition, namely, a clear track ahead; and this it is which brings us to the real measure of speed, which is the question of transportation in its strict sense. This limit will vary with the number of trains already on the line and with the facilities for handling them. First of all, we must know how soon after receiving warning of danger a train running a mile in 30 seconds can be stopped. It is estimated, that if running at 60 miles per hour, with the full braking weight of the train utilized, and the rails in the most favorable condition, this train could be brought to a full stop in 900 ft.; at 50 miles per hour, in 1,600 ft.; at 30 miles per hour, in 2,025 ft., and finally, at 100 miles per hour, in 2,500 ft. These figures at once establish the fact that under the best possible conditions the train must be kept clear of all obstruction for at least 2,500 ft. in advance of a train running at the highest limit, but we must estimate the clearance for the worst conditions, such as slippery rails, foggy weather and unfavorable grades; the personal equation of the engineman must also be considered in a train covering 145 ft. each second.

Mr. Ely then asks the important question: "Would it, therefore, be too much to ask that the engineman receive his warning at least three-fourths of a mile before he must halt?" To this question, everyone acquainted with the subject must answer that the distance is not overestimated, and before it can be reduced some provision must be made for a greater braking power at high speeds. Just what is the best way to do this is

not clear, but probably the simplest way is to increase the air pressure in the train-pipe with a provision for reducing it during the last portion of the stop, otherwise the wheels of the train would be skidded. This would also necessitate an increase in the strength of brakebeams and connections and the exercise of much care on the part of the engineer.

Mr. H. Walter Webb, Third Vice-President New York Central & Hudson River, in the same magazine, under the title of "A Practical Experiment," cites the high speed made on the New York Central Road Sept. 14, 1891, with an eight-wheel locomotive and three cars, an account of which was given in the *Railroad Gazette* at that time, as tending to exert an important influence on railroad speeds. He concludes that transportation and permanent way are the controlling elements in the upper limits of high speed. The following are his two principal paragraphs with reference to permanent way and discipline:

For many years the problem has been to obtain power sufficient to draw heavy trains long distances at high rates of speed. The above figure makes it evident that steam will without difficulty furnish power sufficient to take a train heavy enough to be profitable over a long distance at a rate of speed very much in excess of an average of 60 miles per hour, and attention is now diverted from the motive power to other departments of the railroads and a consideration of whether the road bed, bridges, tracks and safety appliances are such as to permit the use of this power and speed with entire safety and comfort to passengers. . . . And in addition to this, it must be remembered that fast trains such as are now being run on many roads in this country would be simply impossible without the vigorous discipline, the constant energy, the keenest exactitude and the care and attention to the details of the service that is the surest and most effective guard against accidents.

There is, perhaps, a neglect of a consideration of the element of transportation in another paragraph by Mr. Webb. It is this:

With a locomotive such as this (the New York Central Schenectady eight-wheeler, with 6½ ft. wheels) for motive power, it is not a difficult matter to run profit-paying passenger trains over long distances at a running rate of over a mile a minute; this, of course, assuming we have proper character of roadbed and rails and approved appliances to insure safety and rapid speed.

Undoubtedly a train of this sort, running long distances at high speed without stopping, would be profitable, considering only the cost of fuel, wages and minor incidents; but it may be questioned whether there is a profit when the cost is reckoned of side tracking other trains to allow these high speed trains to pass on schedule time. Mr. Webb reaches a rather astonishing conclusion regarding the safety of high speed trains:

It is most emphatically untrue that it is more dangerous than other trains. Those familiar with the subject will agree that the very reverse is the case. As an eminent English authority writes, "With picked engineers, trainmen and firemen, with the best and newest rolling stock, the most perfect engines the company possesses, with every signalman and flagman all down the line on the *qui vive*, it is difficult to see where there comes in any special source of danger."

Engineers and trainmen do not remain "picked," and the signalmen and flagmen do not continue on the *qui vive*, neither does the best and newest rolling stock remain in that excellent condition in which it is first found. Axles and wheels deteriorate, and somewhat rapidly, too. Rails break, brake beams fall and couplers pull out, land slides and obstructions fall on the track, and wash-outs damage the roadbed. Hence, practically all of the possible dangers exist in kind with high speeds as with low. They differ in degree, being more dangerous for the higher velocities in some proportion to the speeds. The completeness of a wreck would probably vary about as the square of the speed; but the increased danger to life and limb is speculative. In addition to this there is also the additional danger, mentioned by Mr. Ely, due to the largely increased distance over which the train must run before it can be stopped. The increased safety at high speed does not appear. If it did, one might conclude without being wholly illogical that it is dangerous to travel at no speed at all; or, that it would be dangerous for a train to stand still on a siding. Mr. Charles R. Deacon, in *Lippincott's* for March, under the title of "One Hundred Miles an Hour," reaches the same illogical conclusion in the following paragraph:

Would faster trains be dangerous? No. In the history of railroads no instance can be found where a train has been derailed by reason of running at a high rate of speed. There is no more danger, intrinsically, at 100 miles an hour than at 40. The dangers to be guarded against bear little or no relation to the question of speed. The strict supervision of tracks and bridges, the abolition of crossings at grade, the fencing in of all lines of railway and the prevention of trespassing thereon—above all, an effective system of signals and safeguards for the guidance and protection of trains—these requirements met, the hundred-miles-an-hour "flyer" will be a safer conveyance than city horse car.

Mr. Forney's article in *Scribner's* is entitled "The Limitations of Fast Running." This we shall consider at some length next week, for we find, or think we find, in it some grave errors of reasoning.

January Accidents.

Our record of train accidents in January, given in this number, includes 120 collisions, 117 derailments and 12 other accidents, a total of 249 accidents, in which 61 persons were killed and 283 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the

circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

	Rear.	But- Crossing ing, and other.	Tot'l.
COLLISIONS:			
Trains breaking in two.....	8	..	8
Misplaced switch.....	4	2	4
Failure to give or observe signal.....	8	1	8
Mistake in giving or understanding order.....	1	5	6
Miscellaneous.....	11	3	20
Unexplained.....	28	13	50
Total.....	60	24	120

	DERRAILMENTS:		
Broken rail.....	17	Track repairers.....	1
Loose or spread rail.....	7	Open draw.....	2
Failure of bridge.....	3	Bad loading.....	1
Defective switch.....	4	Failure in signaling.....	1
Defective frog.....	3	Unfastened switch.....	1
"Soggy track".....	1	Animals on track.....	2
Broken wheel.....	4	Landslide.....	4
Broken axle.....	7	Snow or ice.....	4
Broken truck.....	2	Malicious obstruction.....	5
Fallen brakebeam.....	1	Accidental obstruction.....	1
Broken drawbar.....	2	Unexplained.....	37
Misplaced switch.....	3	Careless running.....	117
Total.....	120		

	OTHER ACCIDENTS:		
Boiler explosion.....	1		2
Cylinder explosion.....	1		1
Cars burned while running.....	1		1
Various breakages of rolling stock.....	3		3
Other causes.....	—		5
Total.....	—		12

Total number of accidents..... 249

A general classification shows:

	COLLISIONS:	DERRAILMENTS:	OTHER	TOTAL	P.C.
Defects of road.....	1	35	38	55	15
Defects of equipment.....	8	16	6	30	11
Negligence in operating.....	53	10	1	63	25
Unforeseen obstructions.....	19	5	21	10	10
Unexplained.....	50	37	—	95	39
Total.....	120	117	12	249	100

The number of trains involved is as follows:

	COLLISIONS:	DERRAILMENTS:	OTHER	TOTAL
Passenger.....	49	54	6	109
Freight and other.....	188	66	6	260
Total.....	237	120	12	360

The casualties may be divided as follows:

	COLLISIONS:	DERRAILMENTS:	OTHER	TOTAL
KILLED:				
Employés.....	21	23	2	46
Passengers.....	3	5	—	8
Others.....	4	3	—	7
Total.....	28	31	2	61
INJURED:				
Employés.....	65	44	2	111
Passengers.....	18	129	—	147
Others.....	4	1	—	5
Total.....	87	174	2	263

The casualties to passengers and employés, when divided according to classes of causes, appear as follows:

	PASS.	PASS.	EMP.	EMP.
Defects of road.....	4	90	8	24
Defects of equipment.....	—	10	2	6
Negligence in operating.....	3	18	25	66
Unforeseen obstructions and malice.....	1	29	6	7
Unexplained.....	1	—	5	8
Total.....	8	147	46	111

Forty accidents caused the death of one or more persons each, and 55 caused injury but not death, leaving 154 (62 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with January of the previous five years shows:

	1892.	1891.	1890.	1889.	1888.	1887.
Collisions.....	120	106	76	45	72	54
Derailments.....	117	93	89	72	131	73
Other accidents.....	12	12	6	7	16	13
Total.....	249	211	171	124	239	140
Employés killed.....	45	38	52	25	43	26
Others killed.....	15	8	15	10	21	20
Employés injured.....	111	118	123	75	107	72
Others injured.....	152	92	104	38	116	65
Passenger trains involved.....	131	79	67	49	118	73

Average per day:

Accidents.....	8.03	6.81	5.52	4.00	7.71	1.51
Killed.....	1.97	1.18	2.16	1.13	2.16	1.48
Injured.....	8.88	6.77	7.32	3.65	7.20	4.42

The January record is marked by the usual characteristics of a winter record, a large increase in the number of accidents due to defects of road. Of the 17 derailments reported as due to broken rails, 14 happened to passenger trains, which may indicate that high speed is an important factor in the causes of the breakages. Severely cold weather prevailed several times during the month in a large territory and the number of these accidents (17) is much greater than in any month for several winters. Last winter six passengers were killed by "spreading of rails" at Bolivar, O., and the winter before six were killed at Carmel, Ind., by a loose rail, but the accounts of both these accidents indicate that cold weather had little or nothing to do with them. Six passengers were killed in December, 1883, by a derailment due to a broken rail, but it was at White Sulphur Springs, W. Va., a place not supposed to be affected by zero weather.

Four of the eight deaths of passengers in our present record are chargeable to broken rails, two at Crawfordsville, Ind., on the 11th, and two at Brainerd, Minn., on the 15th. Fire was a serious feature of both these accidents, and the latter, in particular, would have caused a good deal of discussion about continuous heating systems if it had occurred where a dozen New York or Chicago reporters could have got at the witnesses and the railroad officers. The derailment at Blue Island, Ill.,

on the 22d, is said to have been due to a broken centre pin of the mail car, and a coroner's jury criticised the method of car-inspection in vogue on the road, but we do not learn that any conclusive explanation has been discovered. The butting collision at Aladdin, Ill., on the 5th was a tragic affair, and the theory has been put forth that the heedless runner had died of heart disease; but unfortunately the lessons of experience are such that his negligence can be accounted for without resort to that explanation. It may be remarked that when stations generally are supplied with distant signals (which is not a costly precaution), and enginemen and firemen are required to speak to each other at every fixed signal (a rule which ought to be enforced everywhere), collisions like that at Aladdin will be almost surely prevented. The seventh passenger killed was at Guthrie, Ill., on the 20th, and the eighth, at Clements, Kan., on the 22d, was in a caboose.

At Elizabeth, N. J., on the 2d two passengers were killed after alighting from a train detained by a collision; not by any direct fault of the railroad company, but yet in a way that very likely will cost it something if the matter is taken into the courts. The reports state that the train which struck the victims was running west on the eastbound track. The fatal effect of a mere break-in-two in the St. Clair tunnel on the 30th seems to have been due to ignorance, on the part of the conductor, of the danger from coal gas in such a tunnel.

The reports of the collision at Castile, N. Y., on the 12th state that the engineman of the second train was but 22 years old, and inexperienced; but, on the other hand, the flagman and another brakeman of the foremost train were killed in their own caboose, while it was at a standstill, a circumstance which is always disgraceful to the men implicated. A collision at New Haven, Conn., on the 13th, which, however, did not result in great damage, afforded the Associated Press an opportunity to herald the impressive fact that the switchman who gave a signal prematurely was "summarily discharged," though he had been employed by the road half a century. But the circumstances seem to show that the company ought to have taken more "summary" action in providing such an important junction with interlocking signals, so that a man of 50 years' experience would have had the proper aids for avoiding a blunder.

An electric street car was struck by a freight train in St. Joseph, Mo., on the 6th, injuring nine passengers' two fatally. At Allentown, Pa., on the 22d, an electric car, uncontrollable, ran through a gate and struck a passenger train. The killing of nine men at a highway crossing in St. Louis on the 10th, and of two passengers on a horse car at Chicago on the 14th, has been heretofore reported.

Annual Report.

Pennsylvania Railroad Company.—The report is for the calendar year 1891.

For all lines east of Pittsburgh and Erie, the results are:

Gross earnings.....	\$67,426,841
Operating expenses.....	45,917,445
Net traffic earnings.....	\$21,479,396
Add interest, car accounts, etc.....	6,019,997
Deduct, interest, rentals, etc.....	\$27,499,293
Balance.....	15,527,451
Fund for purchase of guaranteed securities, sinking fund for consol. mortgage and guarantee on Allegheny Valley.....	\$697,464
Extraordinary repairs, revising line and grade, etc.....	\$1,510,758
Balance.....	2,208,222
6% dividend.....	\$9,763,620
To profit and loss.....	7,495,598

Percentage of operating expenses, 68.14; in 1890, 67.94. The text of the report states that there was an increase in the amount distributed to the shareholders of \$1,253,724.50, as compared with 1890, and a balance of \$2,288,022.38 was transferred to the credit of profit and loss, making the aggregate thereof at the end of the year \$24,334,834.33. The dividends declared, amounting to about seven and a half millions of dollars, exceed, both in rate and amount, those paid by any of the large railway systems traversing the same territory. While the lines west of Pittsburgh show a decreased volume of tonnage, their net results are better than for 1890, both the Pennsylvania Company and the newly consolidated Pittsburgh, Cincinnati, Chicago & St. Louis Railway Company showing an increased surplus over all liabilities, and the latter company, in the first year of its operation, being able to pay a dividend on its preferred stock.

Further provision was made during the year, under the car trust system, for equipment, by the issue of \$1,031,000 car trust certificates, bearing four per cent. interest. Under this 1,000 hopper gondolas have been added to the equipment of the main line for special service in connection with the Susquehanna Coal Co., and 925 box cars furnished to the Pennsylvania Co.

There has been expended for construction, equipment and real estate as follows:

Pennsylvania Railroad and branches.....	\$4,868,805.52
United Railroads of New Jersey.....	138,350.15
Philadelphia & Trenton Railroad.....	37,420.41
And for improvements and extensions on branch and auxiliary lines operated by the company	2,323,742.14
Total.....	\$7,370,318.22

There were used in construction and repairs, on the Main Line, 89,078 tons of steel rails, and 1,338,136 ties on the United Railroads of New Jersey division, 7,220 tons of steel, and 292,474 ties; on the Philadelphia & Erie Railroad Division, 6,276 tons of steel and 267,702 ties, making a total of 52,574 tons of steel and 1,003,312 ties.

There were built at Altoona, and other shops east of Pittsburgh and Erie, 177 locomotives, 89 passenger cars, 29 baggage, express and mail cars, 2,230 freight cars, 6 refrigerator cars, and 394 cabin and maintenance of way cars.

The coal shipments increased 2,620,001 tons, or 18.03 per cent, while the coke shipments, owing mainly to the protracted strike in that region, decreased 853,112 tons, or 15.20 per cent. The coal and coke tonnage of the Pennsylvania Railroad Division was 57.72 percent, of its total tonnage.

The aggregate coal and coke shipments over the Pennsylvania Railroad Division amounted to 21,031,306 tons, as against 20,158,877 tons in 1890, an increase of 1,772,489 tons, or 8.79 per cent.

The results for the lines west of Pittsburgh operated by the Pennsylvania Company and the Pittsburgh, Cincinnati, Chicago & St. Louis Railway Company, are:

Earnings Pennsylvania Company.....	\$21,105,977.71
Rental, interest, etc.....	12,655,405.09
Net earnings.....	\$8,450,572.62
Rental, interest, etc.....	6,724,634.26
Net profit.....	\$1,725,938.36
Earnings P. C. C. & St. L. Expenses.....	17,578,629.84
Net earnings.....	13,003,955.17
Rental, interest, etc.....	\$1,574,674.67
Net profit.....	3,683,991.79
Earnings P. C. C. & St. L. Expenses.....	\$890,682.88
Net profit.....	\$2,616,621.24
Net profit of lines west of Pittsburgh for 1891.....	1,700,615.32
Comparative increase on lines west of Pittsburgh for 1891.....	916,005.32
Other lines west of Pittsburgh, profit.....	61,885.57
Of this profit the company is entitled to.....	46,548.98
Which, added to the profit shown above.....	2,616,621.24
Leaves a net profit on all lines west of Pittsburgh for 1891.....	2,602,370.22
Profit on lines west of Pittsburgh for 1890.....	1,750,932.46
Showing a comparative increase for 1891, compared with 1890, of.....	\$906,037.76

The amount expended during the year on capital account on the lines west of Pittsburgh was \$2,603,417.91. The main items of betterment expenditure were in the construction of second, third and fourth tracks and sidings, the extension of yard facilities, the erection of bridges and viaducts, the improvement of the docks at the lake ports, the purchase of real estate at the termini of the various divisions, and additions to equipment. The funds for these purposes were largely advanced by the company. It will probably be necessary to expend on this work and on additional motive power and equipment during the current year between six and seven millions of dollars. There were used in construction and repairs on the northwestern lines 9,435 tons of new steel rails, and on the southwestern lines 11,023 tons, making an aggregate of 20,458 tons.

The amount expended during the year upon the main line between New York and Pittsburgh, and charged to capital account, was \$5,044,576.08, the principal items of which were for equipment, third and fourth tracks, and additional yard facilities, principally at Altoona and Wall's. The improvements at the latter point were brought into use during the year.

With the view of further developing the trade through Erie the western lines have largely increased their facilities for the handling of iron ore and coal at that port.

The Trenton cut-off was completed during the year and a portion opened for traffic about the middle of the summer, but the entire line was not in use until Jan. 11 of the present year. There was also expended in the construction of branch and auxiliary lines the sum of \$2,325,742.14. One of the principal items of this outlay was the work upon the Pittsburgh, Virginia & Charleston Railway, in which the company is largely interested, for the purpose of enabling it not only to better accommodate its rapidly increasing local traffic, but also to secure the prompt movement of through traffic between the main line and the lines west of Pittsburgh. The McKeesport & Bessemer Railroad was completed during the year, and is now in active operation. During the coming year, however, it is expected that the outlays east of Pittsburgh and Erie will not be so great as in the past year, but as it was believed that the through business of the company would require a material increase of box car equipment, contracts have been made for the delivery thereof in the spring of 1892. The capital required for the lines west of Pittsburgh will be materially greater, as those properties have reached a point where the volume of their traffic will require large outlays for double track and increased equipment.

The work of completing the four-track system through the city of Trenton, which necessitated the widening of a number of street bridges, as well as of the large bridge over the Delaware River, and the building of a new passenger station, has been vigorously prosecuted and will be finished during the coming year.

In order to save unnecessary accounting and inspection in connection with freight equipment and secure its more efficient movement, the expenses of repairing have been pooled since the 1st of August, 1891. Under

this arrangement the cost of maintenance of all such rolling stock, east and west of Pittsburgh, aggregating 123,340 cars, is consolidated, and apportioned among the various lines according to the mileage of the equipment thereon. While it may, perhaps, be necessary hereafter to modify some of the details of the arrangement, there is no doubt that the system will ultimately conduce to economical results in the maintenance of the equipment.

A custom house officer must know, either in his own mind or by proxy, how to tell the difference between lace costing \$10 a yard, and that which is worth a trifle less; how to know white sugar from brown when the brownness of the former and the whiteness of the latter make them practically alike; how to use a microscope, and how to perform various other delicate functions. The classification of articles passing through his hands goes into details to an extent only equalled in a dictionary, and his mind must be equally acute and precise. These conditions are gradually being imposed upon railroad freight agents. For the first few years of the railroad era a freight classification was a brief document, and many men now in the service can remember when they knew the contents and the arrangement of their classification by heart. But whether the facts be realized or not, the time when each freight house will require a chemical laboratory and a man to run it is bearing down upon us with relentless tread. Now is the time for each clerk to take a course at a technical school. Possibly we have started the scare a few years too soon, but it is high time to think about it is evidenced by the following extract from a recent circular of the Central Traffic Association announcing a proposed change in the classification of eggs. The circular says:

Eggs in patent cases or carriers, O. R. B., as follows: Cases to be of wood of the following dimensions: Covers, sides and bottoms, $\frac{1}{2}$ in. in thickness; ends, 1 in. in thickness; partitions, $\frac{1}{2}$ in. in thickness; cleats on cover, 1 in. in thickness and $\frac{1}{2}$ in. in width; cleats on end of case 1 in. in thickness and $\frac{1}{2}$ in. wide. No. 1. fillers to be used. Excelsior, cut straw or hay to be used in top and bottom of cases; second class. Please note that eggs in carriers less in dimensions than those above specified will be advanced to first class, as follows: "Eggs in patent cases or carriers, if in cases or carriers of materials of less dimensions than as above provided, or if differently packed O. R. B., first class."

The Master Car Builders' Committee on joint inspection and interpretation of Master Car Builders' rules has sent out a circular of inquiry, and among other questions is one relating to the Master Car Builders' coupler, viz.: "What defects may exist and to what extent may they exist in M. C. B. couplers and not injure their safety or efficiency." This is a pertinent question, to which little attention has been paid. One Western road, as we have before noted, has decided that a coupler in freight service shall be considered unsafe when the knuckle is worn on the inside face $\frac{1}{2}$ in. But no one has made tests to determine how strong a coupler is after reaching that condition, and in general it is not known how strong couplers are or how much they can stand after any given wear. It seems short-sighted to put into service a new type of coupler without knowing just what it will stand. The link coupling is a device the resistance of which can be more easily estimated, yet links are frequently tested. All large roads in purchasing links buy them subject to a test for tensile strength, and it is not clear why some test of this sort should not be arranged for the Master Car Builders' type of coupler. As the matters stand to-day no one knows when a vertical plane coupler is strong enough or in what condition with regard to wear it is safe to run; therefore, the question asked by the committee is a pertinent one and should receive earnest attention. In another column will be found some valuable information on this subject from Mr. Wm. Forsyth.

The Master Car Builders' Association committee on freight car trucks has issued a circular of inquiry asking among other things: "Do you prefer rigid or swing bolster trucks, and what are your reasons for such preference?" This question, if properly answered, will help many who are in doubt when ordering new cars. We frequently find railroad men who are uncertain as to the necessity for a swing bolster truck. The state of mind they seem to be in is about this, quoted from a recent letter on the subject: "We know of no reason why a swing bolster is necessary, yet we hesitate to discard it because we fear that difficulties may arise of which we have no knowledge. What can be the value of a swing bolster truck when the bolster has only $\frac{1}{2}$ of an inch play? Under a locomotive the bolster swings $\frac{1}{2}$ in. each way, and the necessity for it, as well as under passenger cars, is clear; but why under freight cars unless the bolster is allowed some reasonable movement? The reduced cost of repairs incident to a rigid truck is very attractive, and there are many who would like to know why they should continue to use the swing bolster truck when other roads have long since discarded it. The committee on freight car trucks can do some useful work by expounding the reasons pro and con for using the rigid and swing bolster trucks.

It has been one of the arguments of those people (Germans chiefly) who advocate an immense reduction of passenger fares, and a sort of postage-stamp rate,

which will make very little difference between a long journey and a short one, that it will keep the cars full, whereas statistics show that on the average about three-fourths of the seats in a passenger train are empty. The Hungarian tariff has now proved that this is an unjustifiable assumption. This tariff makes the fare for the greatest distance in the kingdom no greater than the fare for 140 miles; but under this tariff during the first year two-thirds of the seats were empty, on the average; and yet, as there had been little increase in passenger stock at that time to provide for the increase in travel, many trains were overcrowded. This was a great improvement on the previous utilization of the cars, which had been but 24 per cent., but with a sufficient accommodation for passengers the 34 per cent. utilization cannot be maintained. In Austria a great reduction in rates and increase in travel resulted in an increase in the proportion of seats occupied from 21.6 to 25.53 per cent. of the whole number, still an immense distance from a "full" utilization of the accommodations. It is hard to make people understand in this country that an average passenger-train load on most railroads can find seats in a single car. The average for the whole country in 1889-90 was only 41, and it is a very favorably situated road that has an average as great as 65.

The short distance rates introduced on the railroads entering Berlin last November, described by the Minister of Public Works as "a sort of inverted zone tariff," make for the third class a charge of 10 pfennige for 7½ kilometres or less, an additional 10 pfennige for any additional distance of 7½ kilometres or less, and a further 10 pfennige for any additional distance beyond 15 kilometres of five kilometres or less. Which being translated into American is:

For 1.66 miles or less, 2 cents.

For 4.67 to 9.32 miles, 4.8 cents.

For 9.33 to 12.43 miles, 7.2 cents.

For the second class the rates are one-half more.

Berlin would seem to be well situated for a great suburban traffic. In the first place, it is a very large city—larger now than New York, unless our last Census lied, and since 1871 growing a great deal faster. In the next place, the elevated railroad, which is part of the state system, passes entirely through the city and connects with a belt road around it, and, moreover, serves as an entrance for trains of some of the other railroads, so that several places in the heart of the city can be reached from most of the nearer suburbs. This is not exactly the time of year for cultivating suburban travel, and the Minister, in referring to the experiment, would not assert that the results were as yet conclusive, but he intimated that they were favorable and that the experiment was likely to have influence on any future general reform of passenger fares.

The Pennsylvania Railroad is trying to get together for purposes of comparison a number of locomotives of different types. The company has ordered therefore from the Baldwin Locomotive Works a 10-wheel passenger engine, compounded on the Vauclain system; from the Schenectady Works a passenger engine compounded on the Pitkin system, and from the same works a simple engine with 19 x 24 cylinders and 6½-ft. drivers, weighing about 123,000 lbs. All of these engines are ordered simply for purposes of investigation and comparison. It is pretty well known that the Baldwin compound No. 82 (Master Mechanics' Association engine) has been running on the Pennsylvania Railroad and on the Pennsylvania lines west of Pittsburgh within the last few weeks, and it is supposed that she has shown quite extraordinary efficiency, and we believe that the experimental engine ordered from the Baldwins is practically a duplicate of this one.

The high speed compound locomotive No. 385, which was shown in our issue of Feb. 12, broke all records Friday the 26th. She ran a mile in 39½ seconds; that is, at the rate of 91.7 miles an hour. The timing was done by two persons with stop watches, and we have good reason to believe that there is no mistake in it. We have received indicator diagrams taken during this run, and shall publish them in our next issue. They show the action of the steam at speeds of from 35 to 91.7 miles per hour.

NEW PUBLICATIONS.

Directory to the Iron and Steel Works of the United States. By James M. Swank, General Manager American Iron and Steel Association, 281 South Fourth street, Philadelphia, Pa. Price, \$4 (16s. 6d.); postage prepaid to any part of the world.

It is unnecessary we suppose to give any description of the contents of Mr. Swank's Directory, which has now become a standard and indispensable book of reference. This is the eleventh edition, and is corrected for February, 1892. The new features which are added include a list of the tin plate works established or undertaken since the passage of the McKinley tariff, and a complete list of existing iron and steel works in Canada and Mexico. In many cases also fuller information is given than has been customary in the past of works that have been heretofore reported. The new edition therefore contains 34 pages more than that of 1890, reaching now 232 pages.

In the 1890 edition 375 blast furnaces were reported as active or likely to become active at the end of 1890. In

this edition 500 are reported, a net decrease of 6; 52 new ones are added to the list, and 58 are subtracted as having been abandoned or torn down. The greatest number of new furnaces built in the two years was in Alabama, being eight for that state. Seven were built in Virginia, six in Illinois, five in Kentucky and three charcoal furnaces in Texas. The building of 11 other furnaces has been begun, six of these in Virginia and four in Tennessee. No new furnace is now building in any Northern state. Special attention is called to the three furnaces built in Texas, which now promises to become one of the iron producing states of the Union; and the building of four charcoal furnaces in Michigan is pointed out as significant. The aggregate annual capacity of the existing blast furnaces is placed by the owners at 16,200,783 net tons, an average of 551 net tons weekly for each furnace. The weekly capacities of the furnaces existing in November, 1890, was 440 net tons, so the smaller number of furnaces now existing has over 3,000,000 tons greater annual capacity than those existing at the end of 1889.

The rolling mills and steel works are put down as 40 in all, against 45 two years ago. In the two years 43 new mills were built and 28 abandoned. In January 1892 18 rolling mills and steel plants were building, against 11 at the close of 1890. Six new standard Bessemer plants have been built in the two years, making a total now of 40, with 95 converters. The open-hearth steel industry has made even greater progress in the two years than the Bessemer; 17 new plants were built and three abandoned, and there are now 71 completed open-hearth plants and four building.

A list is given of 20 tin plate works, and it is said that 10 more are now building.

The number of rolling mills and steel works which used natural gas as a fuel in whole or in part was 104 at the end of 1890. In the two years, however, there has been a great decrease, the entire number of such works now using natural gas being 74. The development of the natural gas region in the central part of Indiana has resulted in establishing several new iron and steel industries there, but in the other natural gas sections the use of this fuel has declined, owing to the shrinkage in the supply. General practice has reverted to bituminous coal, but some works have introduced producer gas or petroleum. In the detail descriptions of the various rolling mills and steel works in this edition of the Directory special mention is made of the new fuels used by them.

Distance and Route Tables—India. Showing the shortest Distance and Route between any two stations in India, etc. By Neville Priestley, District Traffic Superintendent, Indian State Railways, Second edition revised and corrected. Bombay: Educational Society's Press, 1892.

In our issue of April 17, 1891, appeared a description of the first edition of this work with specimens of the tables. The first table shows the distance between any two junctions in India, and gives references to the second table which shows the routes (names of railroad lines) that may be taken between those stations. A third table contains an alphabetical list of all railroad stations and gives the nearest junction on each side of each station and the distances. Finally, there is a skeleton map showing the railroads, junctions and terminal stations. Armed with this book, the simplest person can pick out his journey wherever railroads go in India; and it was probably because he had it that Tarvin was able to move himself with such astonishing promptness from Topaz to Rhatore.

Manual of Statistics and Stock Exchange Hand Book for 1892. New York: The Investors' Pub. Co. Price \$2.

The statistics contained in this publication are, in the first place, those which appear under the name of each railroad in "Poor's Manual," much condensed, however, and the plan has been adopted of giving earnings, gross and net, dividends, etc., for each railroad for a series of years. Further statistics are of anthracite coal shipments and production, lists of securities put on the New York Stock Exchange during 1891, prices and movements of securities and produce of various sorts, and other useful information. As the volume contains but 328 pages octavo, and as a uniform system is followed in grouping the information concerning each railroad, it is very convenient for reference. A defect, however, exists in that the date up to which the railroad information is brought is seldom given, except of course the lists of earnings, etc., by years.

TRADE CATALOGUES.

Rock Drills, Air Compressors, etc. Catalogue No. 8, Second edition. Ingersoll-Sergeant Drill Company, 10 Park Place, New York.

We have frequently had occasion to review the catalogues published by this company, and have often been able to make interesting and instructive extracts from them. The present edition has 222 pages, and the publishers say that it is the largest and, they think, the most useful and beautiful catalogue ever published in their line of business. It has been the aim to compile a book which will serve at the same time as a trade catalogue and as a volume of useful information to practical men engaged in mining, tunnelling and quarrying. The illustrations are drawn with the view of showing ma-

chinery at work, and the reading matter has been arranged to the end that the subject divided under its different departments may be placed clearly before one who seeks this kind of information.

Two-Cylinder Compound Locomotives.—Messrs. Hope & Co., of London, England, have issued a useful pamphlet of twelve pages, containing cuts and diagrams explaining the action of steam in two-cylinder compound locomotives. Such an exposition of this subject has not before been published, and it is a valuable addition to the knowledge of the subject.

Indian Railroad Notes.

Divisional officers have been exploding dynamite in all parts of the country where the rainfall was below the average last season, but with little success. At Bijapur 750 lbs. of dynamite was exploded by the chief magistrate and two engineers, but no rain fell. At Mozufferpur, three charges of dynamite, each weighing 20 lbs., were suspended 50 ft. above the ground, and fired at intervals of nine minutes, but the expected downpour has not made its appearance yet. At Bellary 100 lbs. of dynamite was exploded at a height of 300 ft., but without any result, and the only place where the efforts to induce rain proved successful is in upper Burmah, where the climatic conditions were exceptionally favorable. The Nizam of Hyderabad sanctioned a sum of 3,000 rupees for rain-making experiments nearly two months ago, but the authorities are evidently waiting till the wind is in the proper direction.

The usual three days' rain at Christmas has not been general this year, and in the districts where it was most needed none fell. Already the railroad reservoirs and wells are showing signs of failing, and on some portions of the Rajputana-Malwa Railroad water was being carried to several roadside stations—in portable tanks—more than a month ago. Unless we have early rains some railroads will find it difficult to run the full number of trains during the months of April, May and June, and this is the time when the grain traffic is heaviest. The cold weather crops in Upper Bengal and in some parts of the Madras Presidency, are already so far gone that nothing can save them, and in these districts there will be scarcity, if not actual famine, during the next three months. The Indian cotton crop is from 25 to 30 per cent. below the average. This is partly to be attributed to the scanty rainfall, and partly to the decreased demand for the China market and the Indian mills. In many districts the area sown with cotton is much less than last year. Neither jute nor cotton mills are doing well at present; the former cannot work at a profit while the latter can only sell their produce at ruinous rates.

The East Coast, and some of the Burmah railroads will benefit to a certain extent by the scarcity which prevails in certain districts, as large numbers of cultivators who have no work in the fields are now available for railway work, and the extra cost will be debited to famine relief operations.

Many of the leading rajahs, and landed proprietors in this country are taking a keen interest in the extension of the railroad system. The Rampur Durbar is lending the Indian government 47 lakhs of rupees (\$1,650,000 about) at 4 per cent., in order to hasten the construction of the Bareilly-Moradabad line, which will be 56 miles long, and will cost about 50 lakhs of rupees. Railroads are also being pushed on in many other independent states, and will no doubt prove a good investment. During the financial year from April 1, 1892, to March 31, 1893, the amount of money to be spent on railroad construction will be about 430 lakhs of rupees (over \$15,000,000), but a much larger sum is really needed.

The consulting engineer's report on the Kashmir railroad scheme is not a favorable one. He is of opinion that at present a railroad is not needed, but the Viceroy's visit to that state in October last appears to have brought the subject more into favor, and information as to routes, etc., is still being collected. A broad gauge line will probably be commenced from Attock, on the Northwestern Railroad, to Mozufferabad, via Abbottabad, before long, owing to the recent complications on the Pamirs, and once this is accomplished the extension into the valley itself will be readily taken up by a company.

Sir T. Thompson, of Thompson, Baillie, Barclay & Co., is prospecting the South Coast Railroad from Bombay to Collem. If this scheme is carried out it will give an unbroken system of metre gauge railroad between Mormugao Harbor, the terminus of the West of India Portuguese Railroad, and Bombay.

The Bengal Provincial Railway Company have been empowered to construct a light feeder line from Terkeswar to Mugra, a distance of 30½ miles. Flat bottomed steel rails, 25 lbs. to the yard, will be used on wood or steel ties, spaced 2.75 ft. between centres, and the gauge will be 2.5 ft. The maximum speed will be 12 miles per hour, and the locomotives will weigh 10½ tons and the tender 5 tons, the rigid wheel base of the former being 3.5 ft. Although this is but a small line its construction and workings will be watched with interest for two reasons: First, it will be owned, constructed and managed by natives of the country, and, secondly, all the rolling stock will have *boogie* frames.

For the completion of the Assam-Bihar State Railroad, 124 lakhs of rupees (about \$4,350,000) has been sanc-

tioned, but the engineers are still undecided as to how this line is to be carried across the Kosi River which changes its course every year, and has numberless quicksands. If a bridge is built over the main body of the stream one year, it will probably be high and dry the next year, and one of the engineers who knows the country well states that to be on the safe side a bridge 10 miles long will be needed. Training works are not of much use on a wide sandy plain, and as there is a strong current during the rainy season, whatever is done must be of a substantial character.

The North Western Railway has had a series of accidents lately, one of which—a butting collision between two mail trains—has already caused the death of 48 persons, and a number of the wounded are not out of danger yet. The collision occurred on a single track shortly after midnight, and was due to a *change* of orders. The right of way had been given to the *up* mail train, but before the train arrived at Satghara, the operator from the station in advance wired, canceling the order as he wished to start the *down* mail. The operator had already sent one of his men to hand the train order to the engineer of the *up* mail train, and when he was asked to cancel it, he sent another man to recall the man first sent. Instead of waiting until the men returned, he wired permission for the *down* mail train to come on, intending to hold the *up* mail at his station, but, in the meantime, the *up* mail train—which was not supposed to stop at Satghara—arrived, the engineer picked up the train order, and thinking that the track was clear, dashed on at full speed until—after proceeding some miles—he saw the headlight of the *down* mail, when he reduced speed as quickly as possible and then jumped off. The men on the *down* mail engine appeared not to have noticed the approach of the *up* mail, and therefore collided while running at full speed. Both locomotives were badly smashed, and the bolt which secured the truck to the body of a heavy bogie carriage gave way, and the body shot forward, crushing the carriage in front which was of a lighter type. The only way in which the number of killed could be ascertained was by counting the number of heads, the bodies were so mutilated that recognition was impossible. The operator at Satghara, plead that he was overworked, and both he and his witnesses aware that all the signals were at *danger* when the *up* mail passed. He was however sentenced to one month's imprisonment, and a fine of one hundred rupees. The rules state that the "line clear ticket, or train order," is to be *handed* to the engineer of the train by the operator on duty, and that on no account is this duty to be intrusted to a subordinate.

The Satghara operator has appealed against the sentence passed upon him, and has been released on bail. In the grounds of appeal it is urged that there was no proof of criminal negligence against the accused, who sent the train order out to the yard according to the practice in vogue at all small stations, and did not order that it should be delivered to the engineer of the train. It appears that the orders relating to this portion of the duty are habitually disregarded at some stations, and that the operator will have no difficulty in proving this. If he can do this he will probably be acquitted.

The Consulting Engineer's report on the "Nagpur" derailment, to which I alluded in my last, has not been made public. Four fragments of the broken tire have been sent to England to be examined by experts, and the tires have also been examined by some of the best men in India, but the result of their observations are kept secret.

The Bengal Nagpur Railway Company are surveying the route of a line which they propose to construct between Sambulpur and Cuttack, and which will eventually connect their system with the East Coast Railway. The same railroad has arranged a new time-table for a through service between Calcutta and Bombay, which saves the long *détour* via Allahabad and Jubbulpore, but, although there is a saving in distance of nearly 200 miles, there will be no saving in time at present, owing to the embankments being new and the gradients heavy.

The Smila-Kalka narrow gauge railroad is again hanging fire, and the promoters are now remodeling their proposals with the hope of eventually gaining some of the concessions asked for. The Nilghiri Mountain Railroad is being pushed on apace, but none of the other sanitarians are doing much toward improving the means of communication with the plains, and many people are afraid to risk the long journey in a *dak-gharry*,^{*} which a visit to many of the Himalayan stations entails.

The advisability of connecting the different metre gauge lines is still being considered, but traders in this part of the country are of opinion that this scheme, if carried out, will benefit Bombay at the expense of Calcutta. In addition to laying a third rail wherever possible, several short sections of new line will have to be constructed before the connection will be complete.

The "Lindua," a large sea-going steamer, is now being repaired in the new docks at Kidderpur, the official opening by the Viceroy having been abandoned. There are not at present any indications that the agents of the several steamship lines will prefer to use the docks instead of the jetties, when loading or unloading, but when there is another boom in the wheat traffic, and boats are scarce, the docks will probably come into use and be appreciated.

A few months ago a crusade against Sunday work was

started, but although railroad managers agree to a certain extent with the views expressed, their hands are tied by the length of the systems which they control and by the public demands.

Very little has been done toward supplying trains with automatic brakes since I last wrote, but it is rumored that the locomotives working on the North Western Railroad are all to be supplied with the necessary fittings without any further delay.

Great complaints have lately been made of the want of punctuality on some of the leading railroads, and there is no doubt cause for complaint, when connections at important junctions are missed day after day. From the comments made by the leading journals, it would appear that the railroad authorities are attempting to increase the speed without decreasing the load, and the result is the usual difficulty in making the schedule time.

An attempt was made some years ago to introduce cars of the American pattern, but passengers complained of the want of privacy, and the old system was reverted to. Lately there has been a complaint made against the unsatisfactory manner in which the means of communication between passengers and the conductor is arranged, but such appliances would be unnecessary were the Pullman type of cars used, as the conductor would be able to patrol the train at all times. Native servants are cheap, and the cost of supplying each car with a porter would be so small that it would not enhance the cost of traveling to any appreciable extent. At present every traveler who wishes to be comfortable has to take one of his own servants along. Between Bombay and Calcutta nearly four hours is wasted at refreshment rooms, stations, and the greater part of this might be saved by attaching a buffet car to all through trains. When using Indian railroads for the first time travelers are often astonished at the manner in which the railroad employees regard tips. No amount of tipping will secure a reserved compartment, or, in fact, any indulgence, when traveling in India. The porters only attend to booked luggage, and the registered coolies who attend to a passenger, although quite willing to take double pay, cannot obtain any privileges for him. The railroads fix a tariff, and the best way is to pay the amount demanded and have done with it; but to attempt to bribe a conductor is a mistake, and those who try such means are treated with scant courtesy by the European staff.

On some railroads the free allowance of luggage is liberal, but on others every particle is weighed, and each pound over the free allowance is charged for. The usual rule is, first-class, 120 pounds free; second-class, 60 pounds free; intermediate class, 40 pounds free; third class, 30 pounds free. For distances 450 to 600 miles the rate is one rupee for each 20 pounds of extra luggage. From 750 to 1,000 miles, one rupee, eight annas for each 20 pounds; 1,833 to 2,000 miles, three rupees, for each 20 pounds; 2,833 to 3,000 miles, four rupees, eight annas.

The coal traffic on the E. I. R. has increased very much since the reduced rates for carriage were introduced, and a third line is being laid between Assensole and Raneeunge where a large number of coal sidings are connected with the main line. The Barrakur branch is being extended for about 40 miles, in order to open out the Iherriah coal fields, and if the traffic continues to increase it will be necessary to lay two extra tracks between Howrah and Assensole, 132 miles, and to allow the fast and slow traffic to run on different tracks.

Interlocking switches and signals are being gradually introduced at the principal stations, but native signalmen require a lot of extra training before they can work a number of levers. A few months ago the Burmah mail arrived at Calcutta after the mail for Europe had left and a special train was ordered. Just before the special was ready to start a native switch tender turned a number of wagons, which were being shunted, on to the *same* line, smashing the postal vans and nearly killing the mail clerks. This caused a detention of nearly four hours, and the special had to run at a very high speed in order to catch the mail steamer at Bombay. The switch tender was a man who had many years experience, but native railroad employees often collapse in a most unaccountable manner at the very time when the greatest care is needed.

A serious butting collision between the *up* mail train and a *down* goods train, happened between the Apinere and Madar stations of the R. M. State Railroad, at 4 a. m. on the 21st. Engineer Joseph of the goods train and his two native firemen, and the second fireman of the mail train were killed on the spot; the engineer and first fireman of the mail, and the second guard were slightly hurt; two passengers and the conductor were slightly hurt. The line was blocked for eight hours, and both the locomotives as well as several cars were completely wrecked. Further details as to who is in fault in my next.

NUTLOCK.

CALCUTTA, Jan. 27, 1892.

TECHNICAL.

Manufacturing and Business.

The Field Feed Water Purifying Co., of Chicago, has recently equipped a number of locomotives on the Northern Pacific, Atchison, Topeka & Santa Fe, Chicago & Western Indiana Belt Line, Chicago & Calumet

Terminal and the Grand Trunk Line, with its mechanical boiler cleaner. The device has been used for some time on the Great Northern, Wisconsin Central and the Baltimore & Ohio, and has given very good results. The mileage of the locomotives equipped with the apparatus is said to have been increased over five times and in some cases ten times. No repairs have been necessary since the locomotives were equipped with the device. The waters include the alkali waters of Dakota and the Western Division of the Atchison, well and river water of Wisconsin and lake water.

The Laidlaw & Dunn Co. of Cincinnati, O., has opened a branch house in Chicago at 199 Canal Street, where there will be carried a large stock of steam pumps, including duplex, single direct acting, crank and fly wheel, and deep or artesian well pumps and railroad supplies.

The Egan Co., of Cincinnati, has made application for 20,000 sq. ft. of floor space at the World's Fair to display 40 different machines of their construction and origin.

The American Steel Wheel Co., of New York, will move their works from South Boston to New Jersey, where they will erect a large steel foundry to meet their increasing demands. In addition to the manufacture of car wheels and locomotive driving wheels and centres, they are making solid steel spoke engine truck wheels, 28 in., 30 in., and 33 in. in diameter with a tire 2½ in. in thickness, with which some 50 locomotives have been equipped within the last 60 days.

The Rock Island Automatic Car Journal Lubricator Co., of Rock Island, Ill., has been chartered by William B. Ulleman, William B. Ferguson, Emil Longe and others.

The works of the Berlin Iron Bridge Co., at East Berlin, Conn., are running on full time, being crowded with orders. A large number of highway bridges are being built and also several bridges for the New York, New Haven & Hartford Railroad. The company has contracts for a number of iron buildings, and is building a casting shop 69 x 167 ft. for the American Tube Works at Somerville, Mass., a boiler and machine shop for the Dry Dock Engine Co., at Detroit, a boiler shop 115 x 370 ft. for the Cramp Ship Building Works at Philadelphia, an iron building, 52 x 170 ft. for the Chester Pipe and Tube Co., and the iron work for several office buildings and residences.

Within six weeks' time the ship building firm of William Cramp & Sons will have completed the only plant in the country capable of building, equipping, fitting out and arming war vessels. The capacity of the gun factory now in course of construction will be 10 pieces of ordnance per month, ranging in calibre from one to five inches. Projectiles will also be manufactured.

Iron and Steel.

The report that Cofrode & Saylor would soon build a large steel plant at Reading, Pa., adjacent to the present bridge building plant, is erroneous, as the firm does not contemplate the erection of such a plant at present.

Of the \$125,000 to be raised for the York steel plant, now under construction at Duluth, Minn., \$102,000 has already been subscribed.

Grattan & Jennings, of Buffalo, N. Y., are building a two-story iron and wood structure, 110 x 600 ft., at Buffalo for the New York, Lake Erie & Western, to replace an old flour house near the Erie Elevator, which has been torn down. Plans have been drawn for two freight houses at Buffalo, one 350 ft. long and the other 300 x 100 ft., but these may not be erected for some time.

Solid Bridge Floors.

We noted recently that a bridge being built by the Adirondack & St. Lawrence Railroad, near Trenton Falls, N. Y., will have the longest span of ballasted floor yet built in the United States. The bridge consists of three spans—one of 200 ft., one of 90 and one of 60. It is over West Canada Creek.

The bridges on this line are all of the solid floor type; those of 10 ft. and under have rail floors; from 10 to 34 ft. they have longitudinal troughs; from 34 to 100 they are plate girders, and from 100 to 200 lattice girders. There is but one through truss bridge on the line; this has two spans of 135 ft. each. There are five bridges from 350 to 400 ft. long. All of these are designed by Mr. Charles F. Stowell, of Albany, bridge engineer, under the direction of Mr. George H. Thomson, consulting engineer, who is well known as bridge engineer of the New York Central & Hudson River. These structures are designed by Mr. Thomson for heavy engines, but with special reference to safety, speed, economy and maintenance. The ballast is broken stone and screened gravel, and it is believed that no other railroad in the United States has such a thoroughly robust system of bridges.

The rails which are being laid on this railroad are 72 lbs. per yard, designed by Mr. P. H. Dudley, and the ingots were carefully inspected for pipage. The road is being built under W. N. Roberts, chief engineer, and E. M. Burns, general manager, and it is the intention of Dr. W. S. Webb, the president, to have it open for early summer travel.

Car Lighting.

The Safety Car Heating and Lighting Co. has contracted to equip 100 cars for the Philadelphia & Reading with the Pintsch apparatus. The cars can be charged from the Jersey Central works at Jersey City or from the works existing at Reading.

^{*}A rough description of mail coach.

Electric Traction.

Mr. Henry Villard, when in St. Paul last week, stated that one of the objects of his visit was to arrange for tests of freight and passenger electric motors on tracks of the St. Paul & Northern Pacific between St. Paul and Minneapolis. He spoke of the recent visit of the commission to the works of the Westinghouse, Thomson-Houston and Edison companies to investigate the development of electricity as a motive power. Plans and specifications have been prepared for experimental electric motors. These have been submitted to the electric companies who are expected to build the motors which will be used in making practical experiments in operating both passenger and freight trains. The commission was absent nearly a month, and included J. W. Kendrick, Chief Engineer; G. W. Dickinson, Assistant General Superintendent; E. H. McHenry, Assistant Engineer, and J. C. Barber, Master Car Builder, all of the Northern Pacific; F. W. Fratt, Chief Engineer of the Wisconsin Central; Mr. Myers, an electrical engineer; Dr. Barnard, a scientific engineer, and several other electrical experts.

Electric Turntables.

In an address on electricity in railroad service, delivered recently before the Verein für Eisenbahntechnik, at Berlin, Mr. Böhl directed special attention to the adaptability of electric motors to the operation of turntables and transfer tables generally, and to their extending use for that work. Probably the first experiment in operating turntables electrically was made in Germany about two years ago, and since then the advantages of the method appear to have become generally recognized. A special class of motors for this work is turned out by the Allgemeine Elektricitäts gesellschaft, of Berlin, and has met with much favor. Rapidity and certainty of action and low cost of operation are among the principal advantages claimed for the method.

Electric Railroads.

Under the head of "Electric Railroads," Mr. Ludwig Spangler contributes to the *Zeitschrift of the Austrian Engineers' and Architects Society*, of Feb. 5, 1892, an article in which those particularly interested in this branch of applied electricity will find much that is instructive and profitable. Beginning with a brief introductory chapter, historical in part, the author considers the various electric railroad systems shown at the Frankfort exhibition last year, giving illustrations of the essential features of some of them, and then makes a general discussion of the subject of electric vs. steam roads. Electric traction as a means of propulsion on railroads, Mr. Spangler asserts, is of German origin, Dr. Werner Siemens having been the first to build an electric locomotive in the year 1879. This was shown in practical operation at the industrial exhibition at Berlin in that year.

Tunnel Ventilation in Italy.

Speaking of tunnel ventilation, the Austrian *Eisenbahn-Zeitung* directs attention to the experiments recently carried out in Italy in this field with what is stated to be Saccardo's system. In this, the use of costly ventilating shafts, or of large ventilating fans is entirely dispensed with, but air under pressure from a reservoir, conveniently located, is supplied by a main to different points in the tunnel to be ventilated, and practically positive movement of the air in the tunnel is thus secured. In the Pratolino tunnel, which is 3,000 metres (about 11,800 ft.) long, and has a sectional area of 25 square metres, about 270 sq. ft.) The system is said to work to entire satisfaction, portable eight horse power boiler and air compressor outfit being used. The system has the advantage of being readily applicable to any tunnel, and of being comparatively inexpensive in installation. It is to be tried in connection with some of the larger tunnels, the Italian war department, among others, being actively interested in the projected experiments.

Thomas Steel for Rails.

Thomas steel for rails was the subject of a long paper recently read by Johann Rybar before the railroad section of the Austrian Engineers' and Architects' Society. In it he reviewed the present status of the Thomas process with special reference to its adaptability to rail manufacture, and gave a number of tabulated statements of test results obtained with Thomas steel rails on different European railroads. From the experiences thus far gained with the metal, Mr. Rybar concludes that the method of manufacture has been sufficiently developed to warrant the use of the steel for rails, even though the matter of uniformity of texture is yet open to discussion. He further favors hard steel for rails, particularly for rails of heavy cross section, pointing, in support of his view, to the unfavorable experiences gathered with heavy rails of comparatively soft steel in a number of places where they were tried. Mr. Rybar's paper is published in full in the *Zeitschrift of the Austrian Engineers' and Architects' Society* of January 29, 1892.

Union Switch and Signal Co.

Mr. George H. Westinghouse has issued a circular to the stockholders of the Union Switch and Signal Company asking for proxies for the coming election. Mr. Westinghouse is reported as saying:

"The members of the present board, themselves holding but a small amount of stock, were elected at the last annual meeting by the wrong & use of proxies intended for me. A number of influential business men and bankers in Pittsburgh have expressed to me a willingness to become directors of the company, and my request

for proxies is simply on account of my desire to have the support of all stockholders in order to elect a board that will strengthen the financial position of the company and actively aid in pushing its business."

The present directors are seeking to be re-elected and are asking for proxies on the ground of the good management of the company.

Mannesmann Tubes.

It is said that in Germany the utility of these tubes is becoming more and more manifest, and with their increasing production both the material of which they are made and the methods of manufacture are improved. Every gas blister or other flaw in a steel ingot is pretty certain to cause breakages as the block is drawn into a tube and greater certainty of good material has been attained, while the methods now in use develop any defect in the first operation.

In addition to pipes for high pressures and for telegraph poles, the products of this process are being largely utilized for military purposes. The preparation of large guns and of gun barrels has been simplified and expedited, and in the matter of shells, whereas it takes a day to make one by the old process, the Mannesmann process will turn out 1,000 in the same time. The process is also useful in manufacturing lance shafts and wagon poles. As army wagons are stored for long periods, it is desirable to have as little wood work about them as is possible, and they have been made of riveted steel. The Mannesmann wagon poles, the wall of which is only $2\frac{1}{2}$ millimeters thick (.084 inch) at the point and $4\frac{1}{2}$ (.1772 inch) thick at the butt, weigh a kilo less than the riveted ones and stand a strain of 600 kilos against 450 kilos for the riveted ones.

Car Couplers.

The Smillie M. C. B. coupler was placed on five important railroads during the month of February. Among the orders were 800 for the Long Island, 600 for the New York, Susquehanna & Western, 400 for the Plant system.

Aluminum.

Almost simultaneously with the reduction in price of aluminum in this country to 50 cents per pound, in lots of not less than one ton, the Neuhausen Company, in Germany, made the offer to supply the metal at 5 marks per kilo. in lots of not less than 100 kilos. The prices, it will be noticed, are practically the same in both cases.

New Pavement.

A novel form of street pavement is at present being tested at Frankfort-on-the-Main, Germany. On a foundation layer of béton is placed a network of flat iron strips about 40 mm. (about 1 1/4 in.) deep, and into the interstices of this network molten asphalt mastic is poured. This arrangement is supposed to do away with the objectionable influences of high summer heat on ordinary asphalt paving, and it is further claimed to give a better foothold to horses. It is somewhat suggestive of the recently much talked of Monier system of arch construction. The cost of the new pavement, as might be expected, is said to be rather high.

THE SCRAP HEAP.**Notes.**

A land slide on the Pittsburgh, Cincinnati, Chicago & St. Louis, at Birmingham, Pa., recently blocked the road for 10 days.

The Ohio Supreme Court decided on March 1 that the Massie law levying an annual tax of \$1 a mile on railroads was unconstitutional.

Adelbert D. Seyle (heretofore reported "Sly") was sentenced at Clayton, Mo., Feb. 23, to 20 years' imprisonment for the Glendale (Mo.) train robbery.

The Illinois Central yardmen at Cairo, Ill., struck last week and have interrupted business considerably. They demand the discharge of the local agent of the company.

The shop of the Savannah, Florida & Western, at Savannah, Ga., was partially wrecked on the morning of Feb. 29 by the explosion of its boiler, killing four men. Many valuable patterns were destroyed.

The lower house of the Ohio Legislature has passed a law forbidding stoves in passenger cars after Sept. 1, 1893. It does not apply to roads less than 40 miles long and permits approved stoves in dining cars.

Gregory Haney, an employé of the Pittsburgh, Cincinnati, Chicago & St. Louis, who died recently at Wheeling Junction, W. Va., after 28 years' service, had been laid off 20 times because of broken limbs or other injuries, and finally died of lockjaw resulting from a broken leg.

The Great Northern Express Co. commenced business on March 1, operating on the lines of the Great Northern. The officers are J. J. Hill, President; W. J. Footner, Vice-President and General Manager; Edward Sawyer, Secretary and Treasurer. The headquarters of the company are at St. Paul.

The Railway Car Association, the headquarters of which are at Buffalo, is to have an office in Chicago, with C. J. Fellows as Western Manager. The company will employ four traveling men. Records of private as well as line cars will be kept and men will be employed to daily traverse the various yards in Chicago, ascertaining the situation of affairs and reporting to those interested. Agencies for the same purpose will be established at St. Louis, Kansas City, Council Bluffs and Denver.

The Union Pacific has granted the demand of the conductors and brakemen that overtime be computed by the

rules that govern in the case of engineers and firemen, which was the main point at issue in the negotiations at Omaha, which have been going on several weeks. The employés of the shops of the Philadelphia & Erie, at Renovo, Pa., have begun to work ten hours a day instead of eight. A meeting of engineers, conductors, firemen and trainmen of the Pennsylvania, between Philadelphia and Altoona, was held in Harrisburg last Sunday. A committee of two from each of the brotherhoods was appointed to formulate certain grievances in writing, to be acted upon at a future meeting.

The Chicago, Milwaukee & St. Paul announces that on April 3 a sleeping car route will be established between Chicago and Denver via Omaha, Lincoln, and the Burlington & Missouri River road. The train will leave Chicago at 6 p. m. and the time to Denver will be 38 hours. The Chicago & Alton will on March 20 put on a limited train between Chicago and St. Louis to run through in 8 1/2 hours each way. The train will leave Chicago at noon and St. Louis at 8 a. m. There will be a buffet car and no stops will be made for meals. The distance between the two cities is 283 miles, which makes the rate of speed about 33.3 miles an hour. The Alton recently ran a special train of four cars from Kansas City to Chicago, 490 miles, in 11 1/2 hours.

Spanish American Notes.

A commission of engineers is now engaged in drawing up plans for a breakwater and wharves at Iquique, Chili.

The work of laying track has commenced on the rail road between Santa Tecla and San Salvador, Central America.

The Central Uruguay Northern Extension Railroad has been completed, and the final section from Tacuarembó to Rivera, 73 1/2 miles, has been opened to traffic.

The State Railroad Department of Chili has asked for tenders from foreign manufacturers for 150 cattle cars, 300 box cars and 72 pairs of wheels for passenger cars. This we understand is only the beginning of still larger contracts which the Chilean government will let for railroad equipment.

The Cúcuta Railroad Co., of Cúcuta, Colombia, is seeking the services of a competent engineer to take charge of the construction of an extension of this line. The requirements are, aside from competency, that the applicant shall be sufficiently acculturated so as to run little danger of contracting yellow fever.

Traffic returns from the La Guayra & Caracas Railroad, Venezuela, show gross receipts for 1891 of \$761,540, an increase of \$125,000 over the receipts for the previous year. The length of this line is 23 miles. The Puerto Cabello & Valencia Railroad, 34 miles long, took in during the past year \$321,200, a gain of \$44,500 over 1890.

The energetic protests of the Dutch holders of Uruguayan bonds against the proposed conversion scheme have proved unavailing, and the interest upon the Uruguayan debt will now be reduced to three per cent. A like reduction of interest guarantees upon railroad capital invested in that republic forms part of the scheme.

The congress of Costa Rica has sanctioned the decree granting Mr. Minor C. Keith \$500,000 in addition to the land grant in the San Carlos district of Alajuela, on account of the Northern, Lake Nicaragua and Pacific Railroad. This line, which is now under construction, will call into existence a considerable inter-state traffic in Central America.

The Trans-Andine Railroad is nearly completed that a gap of only 84 kilometres remains between present terminal and the entire distance between Buenos Ayres and Valparaiso, amounting to 862 miles, can now be traversed in 72 hours, including necessary delays. The cost of the journey is \$150. The old route via the Straits of Magellan occupies 12 days, and costs \$200.

Early last month Admiral de Cuverville, of the French North Atlantic Squadron, visited the Isthmus of Panama under instructions from the French government to examine and report upon the actual state of the Panama Canal. This visit temporarily animated the hopes of people on the Isthmus, who have not yet abandoned the belief that this ill-fated enterprise will be resumed.

The annual revenue returns from Argentina for the year ending Dec. 31, 1891, reached 71,500,000 pesos currency, equal in gold to \$18,528,000 United States money. While this fell below the official estimate by no less than \$9,500,000, the expenditures for the past year amounted to only \$19,116,650, leaving a deficit of \$588,650, a much more favorable result than most people in this country anticipated.

It is reported that the Trans-Andean Railroad into Bolivia has reached the town of Pazna, and that the bridge across the Rio Pazna is completed. If this is true it means that railroad facilities now reach to within 60 miles of Oruro, and have opened up some of the finest mineral lands in Bolivia. Pazna lies a few miles east of the Lake Pampa Ullaga, which receives the overflow of Lake Titicaca.

The project for a grand central depot for all the railroads centring in Buenos Ayres has assumed a definite shape. The President of the National Railroad Board at a recent meeting with the superintendents of the several roads decided to have plans drawn up at once. It is intended to erect the structure on State land near the famous Madero Port, and it is thought that it will be built largely of iron and steel.

From the following extract from the Argentine Railroad Law it is evident that Argentina proposes to grant abundant protection to passengers: "The traveler who, for want of room in the coaches, is obliged to travel in a superior class to that for which he has taken a ticket, must not pay excess to the railroad for making use of the higher class. When for the same reason, a traveler has had to occupy a seat of inferior class to that specified in his ticket, the company must at the end of the journey refund to him the entire amount paid for his ticket. If all the seats corresponding to the class for which a ticket has been issued are occupied, and thereby a passenger is compelled to stand, he can demand that one-half of the price of his ticket be refunded, unless there be a special agreement to the contrary."

The shareholders of the Mogyana Railroad Co., a native Brazilian corporation, have voted to increase the capital of the company to \$80,000,000 milreis, and the Board of Directors has been authorized to purchase the Bragantina Railroad. The latter line branches off to

the northward from Campo Lento on the São Paulo Brazilian Railroad to Bragança, a distance of 32 miles. It was opened to traffic in 1886, and cost, including equipment, \$1,120,000. We have recently called attention to the proposal of the Mogiana Railroad Co. to build a double track line from Campinas to the port of Santos, a convenience demanded by the growing traffic between those points. This proposal has been energetically opposed by the rival railroad corporations in the state of São Paulo, which have as a last resort agreed to build a double track road themselves, and to acquiesce in the granting of a concession to the Mogiana Co. for a single track narrow gauge road through the same territory. The indications are, however, that the Mogiana Co. will obtain the concession it is seeking.

Denver & Rio Grande Telegraph Rules.

The following rules were adopted at the conference between the officers of this road and the complaining operators on Feb. 20:

"Eight hours actual dispatching and the time required to make transfers shall constitute a day's work for train dispatchers. No train dispatcher shall be required to work more than eight hours per day at actual dispatching regularly. If required to work more than eight hours they shall receive overtime pro rata."

"At relay offices, where more than two men are employed, ten hours shall constitute a day's work for day operators and managers, and twelve hours for night operators, overtime to be paid pro rata."

"At other than relay offices, where two men are employed, 12 hours (including meal hours) from 7 a. m. until 7 p. m. for day operators, and from 7 p. m. until 7 a. m. for night operators, shall constitute a day's work."

"If kept on duty by proper authority more than 12 consecutive hours, operators shall be paid for overtime pro rata. In computing overtime, less than 30 minutes shall not be counted; over 30 minutes and less than 60 minutes shall be considered one hour."

"All employés in telegraph service will be regarded as in the line of promotion, advancement depending upon faithful discharge of duty and capacity for increased responsibility. Where merit is equal, seniority will have the preference."

"Charges against any dispatcher or operator must be made in writing. In case any dispatcher or operator is suspended or dismissed for reasons which he considers unjust, he shall have the right to refer a statement of his case, in writing, to the superintendent of the division on which he is employed."

"A thorough investigation shall be given. In case he is dissatisfied with the result of the investigation, he shall have the right to appeal his case to the general superintendent. If, upon investigation, the employé is relieved of the charge against him, he shall receive full pay from time removed until reinstated. If, after said investigation, the employé is suspended, the time of suspension shall date from the day he is removed."

The advance in wages is based upon a minimum of \$65 per month.

Lake Traffic and Ship Building.

Mr. C. H. Kup, of the Lake Carriers' Association, reports to the Bureau of Statistics that a total of 30,299,006 tons of freight was carried an average distance of 566 miles on the lakes during the season of 1890. This makes a ton mileage of 17,149,273,000, or almost exactly one-fourth of the total ton mileage of the railroads of this country. The average freight rate per ton per mile on the lakes was 1.3 mills, and on the railroads 9.22 mills. And the lake traffic resulted in a saving, compared with an equal amount of railroad transportation of over one hundred and thirty-five million dollars.

It is thought that contracts for carrying ore have not been placed to any great extent, but rates are held at \$1.25 to 1.35 from Ashland and Two Harbors, and season contracts are announced for wheat, Chicago to Buffalo, at 3½ c., to 3¾ c., and 4 c. for Duluth, while the rates for flour and coal are advancing. This will hurry the completion of the 32 steel vessels now under contract at the various lake shipyards. There were, on Dec. 1 last, 89 steel vessels afloat on the lakes, with total tonnage of 127,042 tons. There were 156 steamers, at that time, of wood, iron and steel, which registered over 1,500 tons each, and it is claimed that those now building will average larger than any preceding season's output.

Securities Listed at the New York Stock Exchange.

The New York Stock Exchange has added to the lists for dealings securities as follows:

Baltimore & Ohio.—\$13,525,000 common capital stock and \$8,975,000 Farmers' Loan & Trust Co. beneficial interest certificates for common capital stock.

Chicago, St. Paul & Kansas City.—\$9,068,000 first mortgage five per cent. bonds and \$9,628,000 first mortgage five per cent. bonds of the Minnesota & Northwestern.

Flint & Pere Marquette.—\$150,000 additional first mortgage five per cent. bonds, making the total amount listed \$3,083,000.

Iowa Central.—\$500,000 additional first mortgage five per cent. gold bonds, making the total amount listed \$6,400,000.

Lehigh Valley Terminal.—\$3,000,000 additional first mortgage guaranteed five per cent. bonds, making the total amount listed \$10,000,000.

Lehigh Valley Railway of the state of New York.—\$800,000 additional first mortgage 4½ per cent. gold bonds, making the total amount listed \$11,300,000.

The Mesaba Ore Field.

Assistant State Geologist Winchell's report sets forth that the Mesaba (Minn.) is the greatest iron ore bearing range in the country. From it ore can be mined cheaper than from any other range, and it is 25 miles nearer Duluth than the Vermillion range. The ore is in beds with a dip of from 12 to 40 degrees, and the formation extends almost 140 miles from the Mississippi, and into the Canadian boundary line. The eastern end of the deposit is not near the surface, and the diamond drill will be necessary to determine the area and thicknesses of the deposit; but the western portion is nearer the surface, and the ore is so soft that it can be excavated by a steam shovel and placed on the cars at 50 cents per ton. The ore is said to contain 60 per cent. of metallic iron, and is low in phosphorus. The Duluth, Mesaba & Northern Railroad is clearing its right of way, and on the 16th Inst. the West Duluth Village Council gave the road the right to use Fond du Lac avenue to the dock site for its tracks. Contracts have also been signed for building ore docks, which will have a capacity for shipping 1,000,000 tons of ore per annum. The floor of these docks will be 54 ft. above the water and will require about 3,500,000 ft. of timber, costing \$200,000.

Division of Freight Traffic in England.

The North British and the Caledonian railways have made an arrangement for a division of competitive traffic and against building or promoting new lines for 25 years. The arrangement is said to have made a good deal of excitement among the traders, particularly at Glasgow; who are organizing active opposition to it.

LOCOMOTIVE BUILDING.

The Lehigh Valley has ordered four large compound consolidation engines* from the Baldwin locomotive works.

The Toledo & Ohio Central will receive six of its new 10-wheel freight engines the latter part of April. The new engines are being built by the Brooks Locomotive Works, and will weigh 120,000 lbs. loaded.

The Baldwin Locomotive Works will begin in a few days the delivery of 40 new engines for the Baltimore & Ohio. The contract for the engines was given about three months ago, and before April it is expected that all of them will be delivered and in service.

CAR BUILDING.

The Ensign Manufacturing Co., of Huntington, W. Va., last week received an order from the Northern Pacific for 500 Canda cattle cars, and also an order from the Chesapeake & Ohio for 200 30-ft. double hopper coal gondolas.

The recent car orders of the Lehigh Valley include 4,000 cars, which have been awarded as follows: 2,000 house cars, 60,000 lbs. capacity, to be equipped with M. C. B. coupler and air brake, to McKee, Fuller & Co., Fullerton, Pa.; 1,000 double hopper, 60,000 lbs. capacity coal gondolas, M. C. B. coupler, to the Jackson & Woodin Mfg. Co., Berwick, Pa.; 500 to Pardie, Snyder & Co., Watsontown, Pa., and 500 to the Buffalo Car Works, Buffalo.

The Lehigh Valley Railroad has built some passenger cars recently which are very good in interior arrangements. They have canvas head linings of a durable kind and neat color. They have Hale & Kilburn seats, and improved and convenient coat and hat hooks at each seat with commodious package racks. There are other minor conveniences for passengers which make these cars quite as comfortable as some parlor and chair cars.

BRIDGE BUILDING.

Delaware County, Pa.—The Philadelphia, Wilmington & Baltimore has constructed a temporary bridge over Darby Creek, and in a few weeks work will be commenced on the three-arch stone bridge, which is to take the place of the old bridge, and will be built for four tracks.

Doddridge County, W. Va.—At the last session of the County Court of Doddridge County, W. Va., it was decided to build a bridge over the Middle Fork of Hughes River, near Oxford. C. B. Robinson, W. S. Ross and Albert Zinn were appointed a commission to have charge of the preparations for the work. The plans will probably be ready so that the work can be let in May.

Knoxville, Tenn.—The Marietta & North Georgia Railroad has let the contract for the new bridge across the Tennessee River at Knoxville, Tenn., to the Passaic Rolling Mill Co. This bridge is composed of three pin connected truss spans, one a through span 272 ft. c. to c. of end pins, and two deck spans 205 ft. c. to c. The estimated weight is 600 tons. It will be entirely of steel, and built according to the specifications of C. R. Walton, Chief Engineer.

Leavenworth, Kan.—An election has been ordered to take place in April on the new steel bridge over the Missouri River at Leavenworth. It is proposed to vote \$50,000 for the project. The bridge will consist of four steel spans, on stone piers, having a total length of 1,100 ft. The entire length will be over a mile. It will cost \$600,000.

Long Island & New York Terminal.—The company was incorporated in New York last week with a capital of \$1,000,000, to build a road four miles long, from the village of Laurel Hill, Queens County, to a point in New York City on Park avenue, between Thirty-Fourth and Forty-second streets. The directors are officers of the Long Island roads.

Memphis, Tenn.—The Memphis & Charleston Railroad has agreed to pay about \$2,500 of the expense of building an iron bridge at Madison street to replace the present structure. The plans for the bridge are to be drawn by the City Engineer and the structure will cost \$7,000.

Minneapolis, Minn.—The Great Northern has placed the contract for the new iron bridge across the Mississippi River, just below Minneapolis, with the Edge Moor Bridge Works, of Wilmington, Del.

Monticello, Minn.—The County Commissioners have accepted the bid of S. M. Hewitt & Co., of Minneapolis, for building the bridge across the Mississippi River at Monticello, which will cost about \$20,000, but the contract has not been signed, as it is not yet approved by all the commissioners.

Newark, N. J.—The Delaware, Lackawanna & Western is rebuilding the bridge on the Morris & Essex Division at Orange Street in Newark.

New York, Lake Erie & Western.—The railroad has recently placed contracts with the Union Bridge Co. for bridges Nos. 2 and 5 on the Newburgh branch and the Black Rock Bridge on the main line. Also two additional plate girder spans for bridge No. 35, Western Division, with the Elmira Bridge Co. Work on the Passaic River drawbridge is progressing actively, and the Union Bridge Co. promises to have the draw span in working order before navigation commences and the bridge complete by June 1.

Norfolk & Western.—It is announced that the Scioto Valley Division of the Norfolk & Western is to be realigned with steel rails throughout.

Ocosta, Wash.—The County Commissioners propose to build a bridge, with a draw, across South Bay near Ocosta at an estimated cost of \$15,000.

Parkersburg, W. Va.—The false work for the river spans of the Julian street bridge over the Little Kanawha River has been completed, and the iron work was begun last week. It is promised to have the bridge opened by May 1.

Pittsburgh, Pa.—The masonry for the new Sixth street suspension bridge is well advanced. All founda-

tions are completed and the main piers up to the coping stones. The superstructure is being manufactured at Athens, Pa., and it is expected that the erection will commence in the latter part of June, and the bridge be completed by November. The Drake & Stratten Co. has the contracts for the foundations and masonry and the Union Bridge Co. for the superstructure. The main spans, two, are 445 ft. centre to centre of piers, carrying a roadway 40 ft. wide and two footwalks 10 ft.

Seneca County, O.—A bill authorizing the Commissioners of Seneca County to issue \$15,000 in bonds to build a bridge over the Sandusky River is pending in the Ohio legislature.

Skagit County, Wash.—Bids will be received by the County Auditor up to April 4 for constructing a wagon bridge across the Swinomish Slough, in Skagit County.

Sumas, B. C.—Government Agent Warnock, of New Westminster, B. C., is calling for tenders for the construction of a Howe truss bridge over the Vedder Creek, near Lumsden's Ranch, Sumas.

Tacoma, Wash.—The Washington Bridge Co., of Tacoma, has been chartered, with a capital stock of \$25,000.

Washington.—A county bridge to cost in the neighborhood of \$40,000 is likely to be erected soon across the Cowlitz River.

Miscellaneous Notes.—The Edge Moor Bridge Works of Wilmington, has a contract for a pin-connected through span, 105 ft. c. to c. for the West Virginia Central & Pittsburgh.

The Chicago, Burlington & Quincy has recently placed contracts amounting to 650 tons of iron bridge work with the Pencoyd Iron Works.

The Kansas City, Ft. Scott & Memphis has placed a contract with the Pencoyd Iron Works for six lattice girder spans, varying in length from 80 to 130 ft. The total weight is about 700 tons.

A bill has been introduced in the New York legislature providing for building a bridge across the St. Lawrence from a point in St. Lawrence County to a point in Ontario. The capital stock of the company is placed at \$500,000. The commission to locate the bridge is made up of William B. Kirk, of Syracuse; Isaac J. Griffith, of Utica; T. F. Huntley, of Syracuse; James A. McFarren, of Syracuse, and Eugene M. Cole, of New York City.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Georgia the Supreme Court rules that the state constitution which provides that all taxation shall be uniform upon the same class of subjects, and *ad valorem* on all property "subject to be taxed" within the territorial limits of the authority levying the tax, does not prohibit taxing one railroad company *ad valorem* on its property, and taxing another railroad company only up to a certain per cent., where such limitation is prescribed by the latter company's charter, granted before the constitution of 1877 took effect.

In Oregon a contract under which the plaintiff performed work for defendant construction company to be made him on the basis of measurement and classification of the work by defendant's engineer, and that all disputes as to amount or classification of work were to be referred to the divisional engineer, whose decision thereon should be final. The Supreme Court rules that plaintiff could maintain an action for the fraud of defendant's engineer in underestimating and classifying his work, without alleging that reference had been duly made to the divisional engineer or that he was privy to the fraud, so that the reference would be useless.

In the Federal Court a contract between the owner of a railroad and a finance company provided for the organization of a new company, of whose directors a majority should be named by said owner, who should be president and whose bonds should be sold by the finance company. The Supreme Court holds that the failure to elect the former owner president, and to allow him to name the directors, was not ground for his rescinding the contract, where the election of the president and directors took place at a meeting at which he was present, and voted for the persons elected.

In New Mexico it was held that under the statute of 1872 authorizing the people of any county to issue county bonds to assist in the construction of any railroad passing through the county, "not exceeding five per centum of the assessed value of the property of the county," bonds to the extent of five per centum may be issued to each road traversing the county, when so ordered by a vote of the people.

The Federal Court decides that the South Carolina act of 1888 declaring all township bonds theretofore issued in aid of a railroad to be a debt of the township, authorizing the levy of a tax to pay it, and providing that the bonds might be used as evidence of the amount and character of such debt, impressed such debt on the township, *proprio vigore*, and it is liable therefor, although the act authorizing the issue of the bonds was unconstitutional, and the bonds void.

In Michigan the Supreme Court rules that a railroad owning the grounds surrounding its depot has a right to adopt and enforce regulations assigning stands for each bus and hack driver while waiting for trains, and where plaintiff resisted such regulation, the stationmaster is not guilty of assault and battery in taking hold of him and ejecting him from the stand assigned to another.

A Dakota statute provides that in lieu of all other taxes upon any railroads, or the equipment, appurtenances or appendages thereof, "or upon other property situated in this territory belonging to the corporation owning or operating such railroads," there shall hereafter be paid by companies accepting the act, for the first five years, three per centum annually of the gross earnings arising from the operation of the road, and thereafter two per centum annually of such earnings. The Federal Court rules that in so far as the act exempts from taxation lands owned by a railroad corporation which are not essential to the discharge of its functions as a common carrier, and which are merely held for sale, it is in conflict with the organic act (Rev. St. U. S. § 1,925), which provides that the legislative assembly "shall pass no law impairing the rights of private property, nor make any discrimination in taxing different kinds of property, but all property subject to taxation shall be taxed in proportion to its value;" and also with the fourteenth amendment to the constitution of the United States.

In New York the Court of Appeals rules that the statute of 1889 amending the act of 1874 providing for the reorganization of railroads sold under mortgage, by

declaring that the act of 1874 should not be construed to compel a corporation organized under the act to extend its road beyond the portion constructed at the time it acquired title, provided the board of railroad commissioners should certify that the public interests do not require such extension, and that such certificates should be a bar to any proceedings to compel the corporation to make such extension, or to annul its existence for failure to do so, and should be final and conclusive in all courts and proceedings, is not void as a delegation of legislative or judicial functions to such board, and, in the absence of a saving clause, is operative as to past causes of forfeiture and pending actions in which no judgments have been obtained.¹²

Carriage of Goods and Injuries to Property.

In New York the Court of Appeals holds that a provision in a bill of lading that claims for damages shall be made within 36 hours after the goods have been delivered, while applicable to shipments beyond the line of the railroad, is void in so far as it applies to a shipment of a car load of potatoes, because the time is unreasonably short.¹³

In Massachusetts the Supreme Judicial Court holds that under a contract for the transportation and delivery of live stock, providing that live animals only will be taken at owner's risk of injury "during the course of transportation, loading and unloading," unless otherwise specially agreed, the carrier is bound to unload the animals, although at owner's risk.¹⁴

The interstate commerce law provides (section 4) that a common carrier shall not charge a greater compensation for the transportation of a like kind of property under substantially similar circumstances, for a shorter than for a longer distance over the same line, in the same direction, the shorter being included in the longer distance. The Federal Court rules that, in an action for breach of this section, the fact that the rate for the longer distance was established jointly between defendant and connecting railroads does not exempt defendant from liability. Also that in order to entitle plaintiff to recover it must appear that the higher rate which he has been charged for the shorter distance was for like services and under similar circumstances. The fact that the freight for the longer distance was billed to some point short of the destination of the shorter haul will not bar plaintiff's recovery, when such freight was intended to be, and was in fact, taken to the destination of the shorter haul.¹⁵

In Georgia the Supreme Court holds that a temporary injunction is properly granted restraining a railroad company from appropriating, under the right of eminent domain, a portion of lands without first making compensation to the *prima facie* owners.¹⁶

In Indiana the Court of Appeals rules that where a fire started by defendant on its own right of way spread to plaintiff's premises, and plaintiff's cattle wandered into the fire, that the injury to the cattle was a proximate result of the escape of the fire.¹⁷

In Kentucky the Court of Appeals decides that there being no common-law obligation for a railroad to build a fence along its line, but it being obliged by statute to build half of the fence after notice, as in the case of persons owning adjoining lands, damages cannot be recovered against a railroad for failure to construct a fence, though it has refused to do so after notice, where plaintiff does not aver a construction of, or offer to construct, his half of the fence.¹⁸

The Supreme Court of Georgia rules that in an action against a railroad company for killing stock, an instruction in general terms that a less degree of diligence in looking out for stock is required in a county where the stock law prevails than in a county in which it does not, or while running through inclosed lands than while running through uninclosed lands, is properly refused, since the law requires "ordinary and reasonable" care in all cases.¹⁹

A Kentucky statute requires railroads to place on the chimneys of their locomotives such screens as will prevent, as far as possible, the escape of sparks of fire. It is held by the Court of Appeals that where property adjoining a railroad was burned by the sparks from a locomotive which was provided with the most approved form of spark-arresters, evidence that, on the occasion of the fire, large showers of sparks were seen flying from the chimney of the locomotive upon adjoining property, and that a few days later an adjoining fence was set on fire by a large quantity of sparks from the chimney, authorized the inference that the arrester was out of order, or improperly adjusted, and supported a finding that the railroad was negligent.²⁰

Injuries to Passengers, Employes and Strangers.

In Indiana, the Court of Appeals rules that when a train stops near a station where it is impossible for a female passenger to alight safely, and such passenger is directed by the company's servants to alight, but when upon the car platform she is told to remain there till the train reaches the station, the violent starting of the train, whereby the door is suddenly closed, injuring the fingers of the passenger, who was holding to the door-frame for support, is negligence.²¹

In Wisconsin a passenger on a freight train wished to get off at a station where the train was accustomed to slacken up, so that passengers could alight without danger. On this occasion the train did not slacken at the station, and shortly after passing it the passenger jumped therefrom, and received injuries which caused his death. The Supreme Court holds the railroad not liable.²²

In Utah the Supreme Court rules that under a statute which provides that "any passenger who refuses to pay his fare or toll on demand may be put off the cars at any stopping place the conductor or employé of the company may elect," the company has no right to eject a passenger for non-payment of fare except at a stopping place.²³

In the Federal Court it is held that where one of the rules of the company, which formed a part of the switchman's contract of employment, required him to inspect and take notice of the style of draw-heads, etc., used in coupling engines and cars, and he alone directed the movement of the engine toward the car to be coupled to it, any injury resulting to him from their sudden coming together, on account of the drawhead being too short, must be due to contributory negligence which will defeat his recovery.²⁴

A Wisconsin statute provides that if a railroad neglects to erect and maintain guards at frogs in its tracks, it shall be liable to a penalty, and also liable for damages occasioned thereby to its servant or agent, notwithstanding such neglect arise through the negligence of any other agent or servant thereof. The Supreme Court rules that this does not make a railroad company liable for the death of a switchman who, through his contributory negligence, was caught in an unguarded frog, and killed by a train which he was in charge of.²⁵

In New York a brakeman was knocked from the top of a box car by a trestle under which the car was passing. The space between the trestle and the running board of the cars commonly used was 5 ft. 7 1/2 in., and plaintiff was 5 ft. 8 in. in height, but by stepping off of the running board to one side of the car plaintiff could pass under the trestle standing erect. The car on which plaintiff was injured was higher than the ordinary car, leaving a space of but 4 ft. 5 1/2 in. between the running board and the trestle. The larger car had been in use to some extent to plaintiff's knowledge for three months before the accident, and plaintiff was familiar with the situation. The Supreme Court holds the plaintiff negligent and the railroad not liable.²⁶

- ¹Atlanta & F. R. Co. v. Wright, 12 S. E. Rep., 578.
- ²Meyers v. Pacific Const. Co., 27 Pac. Rep., 584.
- ³American Loan & Trust Co. v. Toledo, C. & S. Ry. Co., 47 Fed. Rep., 343.
- ⁴Coley v. Board County Com'r Santa Fe County, 27 Pac. Rep., 619.
- ⁵Grannis v. Cherokee Township of York County, 47 Fed. Rep., 427.
- ⁶Cole v. Rowen, 50 N. W. Rep., 138.
- ⁷Nor Pac. R. Co. v. Walker, 47 Fed. Rep., 681.
- ⁸People v. Ulster & D. E. Co., 28 N. E. Rep., 635.
- ⁹Jennings v. Grand Trunk R. Co., 28 N. E. Rep., 204.
- ¹⁰Benson v. Gray, 28 N. E. Rep., 275.
- ¹¹Juod v. C. & N. W. Ry. Co., 47 Fed. Rep., 290.
- ¹²Georgia, C. & N. Ry. Co. v. Archer, 12 S. E. Rep., 636.
- ¹³St. L. & P. R. Co. v. Barnes, 28 N. E. Rep., 328.
- ¹⁴Hall vs. Trustee of Clin. So. Ry., 17 S. W. Rep., 207.
- ¹⁵C. R. & B. Co. v. Summerford, 13 S. E. Rep., 588.
- ¹⁶L. & N. R. Co. v. Taylor, 17 S. W. Rep., 198.
- ¹⁷K. & I. Bridge Co. v. Quirkert, 28 N. E. Rep., 338.
- ¹⁸Brown v. C. M. & St. P. R. Co., 49 N. W. Rep., 807.
- ¹⁹Nichols v. U. Pac. Ry. Co., 27 Pac. Rep., 603.
- ²⁰Brook v. N. P. R. Co., 47 Fed. Rep., 687.
- ²¹Holum v. C. M. & St. P. Ry. Co., 50 N. W. Rep., 99.
- ²²Rock v. M. Co. 15 N. Y. Supt., 872.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Buffalo & Southwestern, semi-annual, 6 per cent. on the preferred stock, payable Feb. 25.

Chicago & Eastern Illinois, quarterly, 1 1/2 per cent. on the preferred stock, payable April 1.

Delaware & Hudson Canal, quarterly, 1 1/4 per cent., payable March 15.

Fort Wayne & Jackson, semi-annual, 2 1/4 per cent. on preferred stock, payable March 1.

Hartford & Connecticut Western, semi-annual, 1 per cent., payable Feb. 29.

Pittsburgh, Cincinnati, Chicago & St. Louis, semi-annual, 2 per cent. on the preferred stock, payable March 21.

West Jersey, semi-annual, 3 1/2 per cent., payable March 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atlanta & Charlotte Air Line, general, New York City, N. Y., March 9.

Bedford & Bloomfield, annual, Indianapolis, Ind., March 9.

Georgetown & Western, annual, New York City, N. Y., March 8.

Louisville, New Albany & Chicago, annual, Indianapolis, Ind., March 9.

Missouri Pacific, annual, St. Louis, Mo., March 8.

New York & New England, annual, Boston, Mass., March 8.

Oregon Short Line & Utah Northern, annual, Salt Lake City, Utah, March 16.

Orleans, West Baden & French Lick Springs, annual Indianapolis, Ind., March 9.

Pennsylvania, annual, Philadelphia, Pa., March 8.

St. Louis, Iron Mountain & Southern, annual, St. Louis, Mo., March 8.

Wichita Valley, annual, Wichita Falls, Tex., March 8.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The New England Railroad Club holds regular meetings at the United States Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month commencing January.

The Western Railway Club holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The New York Railroad Club holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.

The Southern Railway Club holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The Central Railway Club meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The Northwest Railroad Club meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The American Society of Civil Engineers holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The Western Society of Engineers holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The Engineers' Club of St. Louis holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The Engineers' Club of Philadelphia holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The Engineers' Society of Western Pennsylvania holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The Engineers' Club of Cincinnati holds its regular meetings at 8 p. m. on the third Thursday of each month

in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The Civil Engineers' Club of Cleveland holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineering Association of the South holds monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Denver Society of Civil Engineers and Architects holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The Civil Engineers' Society of St. Paul meets at St. Paul Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The Civil Engineers' Association of Kansas holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The American Society of Swedish Engineers holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The Engineers' Club of Minneapolis meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The Canadian Society of Civil Engineers holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The Association of Civil Engineers of Dallas meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The Technical Society of the Pacific Coast holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The Tacoma Society of Civil Engineers and Architects holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The Engineers and Architects' Club of Louisville holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

The Northwestern Track and Bridge Association will meet in the directors' room of the Union Depot, St. Paul, at 2:30 p. m., on Friday March 11.

Mr. McIver's paper on "Plans for Crossing of Two Pile Bridges," and Mr. Buel's on "Frogs," will be discussed.

This being the annual meeting the retiring officers will submit reports and their successors will be elected.

Association of American Railway Accounting Officers

Secretary C. C. Phillips, of Chicago, announces that the fourth annual meeting of this association will be held at the Auditorium, Chicago, May 25. The officers, including four members of the executive committee, will be elected, and papers will be read by Mr. O. W. Mink, of the Union Pacific, on "Uniformity in Accounts," and by Mr. C. G. Warner, of the Missouri Pacific, on "The Traveling Auditor." The local committee, of which M. M. Kirkman is chairman, has arranged with the Auditorium Hotel to accommodate members and their families at \$4 to \$6 a day for rooms with board, and \$2 to \$5 a day for room without board. Members desiring these reduced rates must notify Mr. Phillips by May 16.

Engineers Club of Cincinnati.

At the February meeting of the club one new member was elected, Mr. E. M. Hoadly, and 13 applications for membership were presented.

Mr. R. L. Read, Engineer of the Central Union Depot and Railway Co., described the plans of the proposed viaducts over the tracks of the C. C. C. & St. L. road, which are crossed at several places by streets on the same grade. The system of viaducts proposed eliminates these crossings and confines the travel to the overhead crossings, which are located and arranged to suit the travel in the best manner, and which at the same time allow of a remodelling of the tracks used by railroads entering the Union passenger station, thus greatly facilitating the train service within the limits affected by the proposed scheme.

New England Railroad Club.

The annual meeting of the club will be held at the United States Hotel, Boston, Wednesday, March 9, at 7:30 p. m. The subject for discussion "Freight Car Trucks."

PERSONAL.

—Mr. C. P. Huntington will start on his annual tour of inspection of the Southern Pacific system about March 15. He will visit Mexico before returning to New York.

—President Allen Manvel, of the Atchison, Topeka & Santa Fe, sailed from New York this week with his family. He expects to remain in Europe for five or six weeks, going first to Genoa.

—Mr. S. W. Reynolds, President of the Mexican Central, sailed for London last Tuesday and it is believed that while abroad he will effect a traffic agreement with the directors of the Mexican (Vera Cruz) road.

—Mr. James V. Mahoney, Traffic Manager of the Sioux City & Northern and of the Pacific Short Line since those roads were opened for traffic, resigned this week to enter other business.

—Mr. John S. Kennedy, who was at one time President of the Wheeling & Lake Erie and also a member of the first board of directors of the Metropolitan Elevated road in New York City, died last week in New York.

—Mr. John F. Wallace has been appointed Chief Engineer of the Illinois Central, vice Mr. L. T. Moore, transferred to other duties. Mr. Wallace has been Engineer of Construction for the past year, which position is now abolished. He is a member of the American Society of Civil Engineers and was last year Vice-President of the Western Society of Engineers.

—Capt. W. W. Rich has been appointed Chief Engineer of the Minneapolis, St. Paul & Sault Ste. Marie road, succeeding Mr. W. A. Fisher, resigned. Capt. Rich was Chief Engineer of the road during the time the line was

built, and resigned that position on account of ill-health about a year and a half ago. Since that time he has occupied the position of consulting engineer for the company.

—Mr. William Seaman died Feb. 26, at Wilmington, Del., which he has made his home for the last eight years, during his connection with the Lobdell Car Wheel Co. He was a graduate of Swarthmore College, a civil engineer, and had been connected with the Norfolk, Western, the Diamond State Iron Co., and other industrial concerns. He was resident engineer of construction of the Kinzua Viaduct on the New York, Lake Erie & Western, and of the Cattaraugus Viaduct on the Buffalo, Rochester & Pittsburg.

—Mr. George W. Saul, President and General Manager of the Chicago & Eastern Illinois, resigned last week, and Mr. M. J. Carpenter, who was recently elected President of the Duluth & Iron Range road, has been chosen President of the Chicago & Eastern Illinois. Mr. Saul became General Manager of the Chicago & Eastern Illinois in March, 1880, when that road became one of the Mackey lines, and he was elected President a few months later on the resignation of Mr. D. J. Mackey. Mr. Saul had been for a number of years General Manager of the Evansville & Terre Haute system, and continued in that position when his headquarters were removed to Chicago.

—Colonel George W. Cullum, Corps of Engineers U. S. A. Brevet Major-General, died at his home in New York, Feb. 28. General Cullum was born in New York in 1800, and graduated from West Point in 1833. He entered once the Corps of Engineers and there practically his whole life's work was done. During the war he was at different times Chief of Engineers of the Department of the Mississ. and Chief of Staff to General Halleck. Much of his war duty was in fortifications and siege operations. For a short time he was Superintendent of the Military Academy. In 1874 he was retired for age. He published several books, original and translations, of which perhaps the most important was the Biographical Register of the Officers and Graduates of the United States Military Academy.

ELECTIONS AND APPOINTMENTS.

Alabama & Mississippi.—The following are the incorporators of the company: John R. Long, A. J. Peterson, H. L. Williams and A. W. Gray, of Pickensville, Ala.; C. W. Mills, C. E. Rodenberg, J. T. Armstrong, E. P. Richards and C. H. Ayers, of Columbus, Miss.

Camden & Atlantic.—The following Board of Directors was elected at the annual meeting Feb. 25: George B. Roberts, William L. Elkins, Henry D. Welsh, Joseph N. DuBarry, Thomas H. Dudley, Richard D. Barclay, William C. Houston, William Bettie, Edmund E. Read, Sr., William C. Dayton, Crawford Miller, Enoch A. Doughty, John B. Hay. The board subsequently organized by electing George B. Roberts, President; Gen. W. J. Sewell, Vice-President; James R. McClure, Secretary; Robert W. Smith, Treasurer.

Central Vermont.—James M. Foss, General Superintendent, has been appointed assistant to the President.

Chicago & Alton.—J. H. Ruxton has been appointed Division Master Mechanic of the St. Louis & Kansas City divisions (from Roodhouse to Kansas City) with headquarters at Slater, Mo., to succeed E. J. Whitington, resigned on account of ill health.

Chicago & Eastern Illinois.—M. J. Carpenter has been chosen to succeed George W. Saul as President of this road.

Chicago, Rock Island & Pacific.—Alfred Child, lately general foreman of the car department of the Northern Pacific, has been appointed Division Master Car Builder of this company.

Chicago, St. Paul & Kansas City.—W. C. Rinearson has been appointed General Agent, Passenger Department of this company, with headquarters in Chamber of Commerce building, Cincinnati, O.

Cleveland & Canton.—H. R. Moore, General Freight Agent, will, on April 1, be made General Freight and Passenger Agent of the road, to succeed Albert Rokusek, General Passenger Agent, who will retire on that date.

Cleveland, Cincinnati, Chicago & St. Louis.—The Cincinnati, Wabash & Michigan is to be known after April 1 as the Michigan division of this road, the jurisdiction of Joseph Ramsey, Jr., General Manager, and E. A. Peck, General Superintendent, being extended over the road on that date. The office of General Manager will be abolished and the offices of the Superintendent and Engineer of Maintenance of Way are to be removed to Cincinnati.

Duluth & Winnipeg.—At a meeting of the North Star Construction Co. in Baltimore, on Feb. 23, A. W. Wright, President, and George C. Kimball, Vice-President, resigned. Ernest N. Morrison, of Baltimore, was elected President, and John Hopkins, of Philadelphia, was chosen a director in place of Mr. Kimball. This company is building the Duluth & Winnipeg, and is operating the portion already completed.

Forest Central.—The following are the incorporators of the company: F. F. Whittekin, of Tionesta, Pa., President, and James D. Irwin, Henry C. Whittekin and A. Whittekin, of Tionesta; Hon. Peter Berry, Plummer, Pa.; I. C. Martin, S. E. Martin and M. L. Chadman, of Lancaster, Pa.

Frederick & Pennsylvania Line.—At the annual meeting in Baltimore last week, the following directors were elected: On the part of the stockholders, Charles E. Trail, John S. Leib, R. D. Barclay, G. C. Wilkins, James P. Kerr and James McSherry. On the part of the City of Frederick, M. E. Doll, John Eisenhauer, Joseph F. Payne, E. C. McSherry and J. F. Diffendall. The Directors chose the following officers: Col. Charles E. Trail, President; Stephen W. White, Secretary; J. S. Leib, Treasurer.

Illinois Central.—J. F. Wallace has been appointed Chief Engineer of this company, with office at Chicago, vice L. T. Moore, transferred to other duties. He is to have charge of all matters pertaining to the maintenance of way and of all construction work. He will prepare plans, specifications and estimates for all bridges, buildings and other structures required upon the lines operated by this company. The supervisor of bridges, the master carpenter and, in matters pertaining to the maintenance of way, superintendents of lines will report direct to and receive their instructions from

the chief engineer. The office of engineer of construction has been abolished.

Kauterskill.—At a meeting of the stockholders held at Rondout, N. Y., Feb. 29, Edwin Young, President of the Ulster & Delaware, was re-elected President, S. G. Dumnick Vice-President, and R. B. Jones of Rondout, Secretary and Treasurer.

Lehigh Valley.—W. A. Stevenson, assistant to the General Northern Superintendent, has been appointed Superintendent of the Ithaca division, from Sayre to Geneva, N. Y. E. Van Etten has been appointed Superintendent from Geneva to Buffalo.

Long Island & New York Terminal.—The company has been organized by Austin Corbin, Benjamin Norton, E. B. Hinsdale, William G. Wheeler, Everett R. Reynolds and Charles M. Reynolds, of New York City; William J. Kelly, of Brooklyn; Frederick Cook, of Orange, N. J., and William J. Hehre, of Hollis, L. I. The principal office is in Long Island City.

Louisville & Nashville.—E. H. Burch has been appointed Superintendent in charge of terminal facilities of the Louisville, Cincinnati & Lexington division and Louisville division at Louisville, East Louisville, vice E. P. Bryan, assigned to other duties. E. P. Bryan has been appointed Superintendent in charge of terminal facilities of this company at East St. Louis, Ill., and St. Louis, with office at St. Louis. L. S. Robertson has been appointed Superintendent of the Memphis line, vice O. M. Dunn, resigned. John W. Logsdon has been appointed Superintendent of the Cumberland Valley division, vice L. S. Robertson, transferred.

Meriden, Waterbury & Connecticut River.—The Board of Directors has been reorganized and now consists of F. H. Prince, of Boston; J. A. Bostwick, W. H. Starbuck, Newman Erb, of New York; E. D. Steele and A. S. Chase, of Waterbury, Conn.; A. Chamberlain, C. L. Rockwell and Samuel Dodge, of Meriden, Conn. The officers are as follows: F. H. Prince, President; N. Erb, Vice-President; George Rockwell, of Meriden, Secretary and Treasurer.

Minneapolis, St. Paul & Saint Paul Ste. Marie.—Capt. W. W. Rich has been appointed Chief Engineer to succeed W. A. Fisher, resigned.

New York, Lake Erie & Western.—The circular announcement of the appointment of Alfred Walter as General Manager was issued this week, the appointment dating from March 1. His headquarters are to be at 21 Cortlandt street, New York City.

New York & New England.—General Superintendent I. D. Barton announces the abolition of the office of Superintendent of Transportation F. E. Dewey, who has been Superintendent of the Western Division, with headquarters at East Hartford, has been made Superintendent of the Eastern Division, with headquarters at Boston. Stephen Noonan has been appointed Superintendent of the Western Division, with headquarters at East Hartford, Conn.

L. H. Beaver has been appointed City Passenger and Freight Agent, with headquarters at 322 Washington street, Boston, succeeding J. A. Flanders, who will devote all his time to the Clyde Steamship Line. Mr. Beaver has been Chief Clerk under Mr. Flanders for the past five years.

New York, Susquehanna & Western.—The annual meeting of the shareholders was held in Jersey City last week. Directors were elected as follows: Simon Borg, Charles Minzehsimer, James M. Hartshorne, John P. Rafferty, Alfred Sully, Henry Sanford, Joseph W. Ogden and F. C. Lawrence, Jr., of New York; George N. Farwell and Robert K. Dow, of Claremont, N. H.; John I. Blair, of Blairtown, N. J., and G. H. Hobart, of Peterboro. S. V. White retired from the board and also from the First Vice Presidency. The last-named office was filled by the election of Joseph W. Ogden. Simon Borg was re-elected President.

At the annual meeting Joseph W. Ogden was elected Vice President, to succeed S. V. White. The officers re-elected were: Simon Borg, President; J. P. Rafferty, Second Vice-President, and R. C. Shimeall, Treasurer.

Norfolk, Wilmington & Charleston.—The following is a complete list of the officers of the company: President, J. C. McNaughton, 216 South Third street, Philadelphia; A. S. Cadwallader, Vice-President, Yardley, Pa.; R. Duncan Harris, Treasurer, 35 William street, New York; Carroll Foster, Secretary, Philadelphia; Chambers H. McKibbin, General Manager, 212 South Third street, Philadelphia; Maj. John Runk, Chief Engineer, and F. L. Pitman, Assistant Chief Engineer.

Northern Central.—At the annual meeting of the company in Baltimore last week the following directors were chosen: George B. Roberts, J. N. Hutchinson, B. F. Newcomer, John P. Green, Harry Walters, Henry James, N. J. Du Barry, Louis W. Hall, E. B. Parsons, J. D. Cameron, Luther S. Bent and Henry D. Welch. The Board of Directors re-elected George B. Roberts, President and S. W. White, Secretary. Mr. Roberts resigned the office of Director and A. J. Cassatt was chosen Director in his place.

Northern Pacific.—J. T. Lord has been appointed Master Mechanic at Mandan, N. Dak., succeeding George W. Gardner, deceased.

Ottawa & Gatineau Valley.—J. T. Prince, Superintendent of the Pontiac Pacific Junction road, has been appointed Superintendent (retaining his position with the first named road), with headquarters at Ottawa, Ont.

Pennsylvania Company.—The recent report in this column of the appointment of B. F. Crawford to be Master Mechanic at Fort Wayne, Ind., was erroneous. Mr. Crawford has been transferred from Altoona to Fort Wayne in the capacity of assistant to the master mechanician. There is no official position of assistant master mechanician at any of the Pennsylvania shops.

Philadelphia & Newtoun Connecting.—The following are the incorporators: A. A. McLeod, Philadelphia, President, and J. M. Landis, J. H. Loomis, Chas. L. Midwood, John Walker, Jr., Richard Tull and Daniel Jones, all of Philadelphia.

Port Reading.—The appointment is announced of J. W. Watson, Treasurer of the Central of New Jersey, to the position of Assistant Treasurer of the Port Reading road. He will assist William A. Church, of the Philadelphia & Reading.

Rockford Terminal.—The incorporators and first Board of Directors are: D. Dunlap, Edward H. Marsh and George F. Penfield, Rockford, Ill., and Horace C. Alexander and Fremont Hill, Chicago. The principal office is at Chicago.

San Antonio & Aransas Pass.—J. H. Littlefield, Jr., hitherto Commercial Agent, has been appointed General Western Agent for this line, with headquarters at No. 105 North Broadway, St. Louis, Mo.

Stillwater & St. Paul.—At the annual meeting held in St. Paul Feb. 28, the following Directors were elected: R. S. Hayes, A. B. Plough, James Smith, Jr., D. A. McKinley, L. S. Miller, A. V. Williams and W. H. Coleman. The officers are: R. S. Hayes, President; A. B. Plough, Vice-President; W. H. Coleman, Secretary and Treasurer.

Velasco Terminal.—F. P. Charles has been appointed Auditor of this company.

Virginia Central.—The incorporators of this Virginia company are: Thomas F. Barrett, Julian H. Miller, John S. Johnson, William W. Fleming and Martin H. Dunn.

Wagner Palace Car Co.—F. C. Chamberlain, Assistant Superintendent at Chicago, has been appointed Division Superintendent, with headquarters at Detroit, to succeed J. A. Baylies.

Western New York & Pennsylvania.—P. P. Pratt, President of the Manufacturers and Traders' Bank of Buffalo, has been elected a director of the road.

West Virginia Central.—The annual meeting of the West Virginia Central Railway was held at 172 North Tenth street, Philadelphia, Feb. 23. The old board of directors was re-elected and the following officers were chosen: Alexander Boudrou, of Philadelphia, President and Treasurer; F. T. Clark, Vice-President and Secretary, succeeding in the former office S. A. Kramer, and H. C. McWhorter, of Charleston, W. Va., General Attorney.

RAILROAD CONSTRUCTION, INCORPORATIONS, SURVEYS, ETC.

Adirondack & St. Lawrence.—The construction of this road through the Adirondack wilderness has been continued through the winter, and the contractors have over 4,000 men now at work. It is the intention of the company to have the road ready for operation in July. The length of the line between Poland, the terminus of the old narrow-gauge Herkimer, Newport & Poland, which is now included in the system, northeast to Malone, N. Y., is 175 miles. The track has been laid on about 45 miles, over 75 miles has been graded ready for tracklaying, and nearly all the balance is partly graded. The principal work now being done is on the rock cuts, which are very heavy, and on the masonry. On account of the snow and the condition of the ground the contractors are not able to do much work on the grading at present. John B. Westbrook, of New York, who has the contract from Poland to Old Forge, is employing about 1,500 men, and expects to be through in two months. The line has been graded north of Poland to Moose River, and the track will probably reach White Lake Corners by April 15, but may be delayed at that point on account of a 300-ft. rock cut. The Enterprise Contract Co. is building the section between Old Forge and Tupper Lake, and has between 2,500 and 3,000 men engaged on the masonry and grading between these points. This section includes probably the heaviest work on the entire line, and will not be completed before July. The longest continuous section of track is from Malone south, toward Tupper Lake. The other track so far laid is being in small pieces at various points on the road. The tracklaying will be done by the company. 72-lb. rails being used. The superstructure and equipment are of the best of their several classes, and solid floor steel bridges are being built throughout the line, which are described in another column. The names and addresses of the principal contractors are: John B. Westbrook, 22 William street, New York; Enterprise Contract Co., Knoxville, Tenn., and 45 Broadway, New York City; Brady Brothers, Bergen Point, N. J.; Ellsworth, Chapman & Lathrop, Buffalo, N. Y., and J. V. Hussey & Co., Malone, N. Y. The line beyond Poland passes through Trenton Falls and Remsen (at which point it connects with the Utica & Black River), Forestport, White Lake Corners, Old Forge (at the foot of the Fulton Chain of Lakes), Tupper Lake (the terminus of the Northern Adirondack road), Saranac Inn (and branch of six miles to Saranac Lake), to a point near Rainbow station on the Chateaugay road; thence north parallel with the line of the Chateaugay road to Wolf Pond and Ringville, and, following the Salmon River, to Malone. Dr. W. Seward Webb, of New York, is President of the company, and W. N. Roberts, of Herkimer, is Chief Engineer.

Austin, Fredericksburg & Llano.—The charter of this company was filed in Texas last week. The road is to extend from Austin to Dripping Springs, in Hayes County, Tex. The capital stock is \$20,000.

Baltimore & Cumberland.—The Governor of Maryland has signed the bill amending the charter of this company, which was passed by the legislature last week, and which practically gives the company a special charter with unusual powers. The bill authorizes an increase of the capital stock to \$10,000,000, and empowers the road to consolidate with or lease any other railroad without constructing any part of its line. The charter enables it to build a line from Cumberland through Allegany and Washington counties to Hagerstown, and thence through Frederick, Carroll and Baltimore counties to the city of Baltimore. East of Hagerstown the line would parallel the Western Maryland, in which Baltimore has a large interest through ownership of stock and guarantee of bonds. The new company has offered the city \$5,500,000 for its interest in the Western Maryland. It has been organized by the directors of the West Virginia Central & Pittsburgh, which will use the Western Maryland as its tidewater line, if its offer to purchase is accepted by the city.

Beaver Creek.—A charter has been granted to this company in West Virginia to build a road beginning at Davis, Tucker County, W. Va., and running up Beaver Creek to a point on Stoney River, 18 miles above its mouth in Grant County; thence up Stoney River to Red Creek, Randolph County, thence to the line between Grant and Mineral counties to a junction with the West Virginia Central & Pittsburgh. The principal office will be in Philadelphia. The capital stock is \$1,000,000, and is held by D. C. W. Smith and B. Griffin Smith, of Maryland, and J. Evans, Henry L. Carter and H. W. Stokes, of Philadelphia.

Burlington, Cedar Rapids & Northern.—The surveys for the branch line, 20 miles long, which has been made between Forest City and Manly Junction, Ia., connecting the lines of this company, as noted last week, was not made by this road, but for a number of real

estate dealers of Forest City who are interested in the organization of a local company proposing to build between those towns. The road, if built, will probably be operated by this company.

Charleston, Clendenning & Sutton.—On Saturday last, the directors of this company met at Charleston, W. Va., and awarded the contract for building the first 20 miles of the road from Charleston to the Clay County line, to Worthington, Elliott & Debardeleben, of Birmingham, Ala. The contract calls for the road to be ready for operation Dec. 1, next. Work will begin in 15 days.

Cheasapeake & Ohio.—About 32 miles of second track is now being laid on the Huntington Division west of the Allegheny Mountains. Additional contracts for second track have been let since Jan 1, when 18 miles of the work was under contract—8.5 miles at Covington and 9.5 at Lowell, W. Va. The 32 miles now being built extends from Clifton, Va., west to Hinton, W. Va., and includes the former sections. This is the only second track work which it is proposed to put under contract this year.

Chicago, Altamont & Paducah.—In the Secretary of State's office at Springfield, Ill., were filed, this week, articles of incorporation of this company, with principal offices at East St. Louis. The road to be constructed is from Altamont, Effingham County, to Paducah, Ky. The capital stock is placed at \$5,000,000. The route is the same as that of the Chicago & New Orleans.

Chicago & New Orleans.—The town of Harrisburg, Ill., has subscribed a bonus of about \$15,000 to be given to this company, if it will construct its road through that town. Vice-President C. E. Wyman went to Harrisburg last week, but has not yet agreed to make the change of location which would be necessary. The line has been located through Marion, Ky., which is about 20 miles west of Harrisburg.

Chicago & West Michigan.—The tracklaying on the Traverse City extension has been suspended as noted last week, the rails having been laid six miles north of Bellaire on Feb. 8. The work has been stopped on account of deep snow. This leaves only about 21 miles of track to lay to complete the tracklaying between Traverse City and Potoskey, Mich. That part of the line from Traverse City to Williamsburg and the branch to Elk Rapids was opened for business Dec. 28 last. No part of the line between Williamsburg and Charlevoix has been ballasted. That portion between Charlevoix and Potoskey is partially ballasted. The grading is nearly completed, there being only a few places between Ellsworth and Charlevoix not yet graded. In the foundations for the drawbridge at Charlevoix, the south abutment has been built above the water line. The north abutment has been completed and the centre pier is nearly ready for sinking the caisson. The snow is, at present, rapidly disappearing, and the engineers hope to begin ballasting and tracklaying within a few days. Unless the work is delayed by bad weather this month, the road will, without doubt, be ready for operation in June.

Clarksville Mineral.—Orders have been given to the contractors to resume work on this line and complete at once the seven-mile gap on the middle portion of the branch. The road is being built from near Clarksville, on the Memphis line of the Louisville & Nashville, of which it is a branch, south to a point west of Dickson, Tenn., 31 miles. The track has been laid with the exception of the seven miles now to be built. Munday, McTighe & Co., the contractors, have a suit pending against the Louisville & Nashville for \$83,000, claimed to be due the firm on account of errors in the classification of the work by the engineers. Whether this litigation has been settled does not appear. One report is that the suit has been compromised, and another that the contractors have declined to resume construction work, claiming that it would prejudice their suit.

Cleveland, Cincinnati, Chicago & St. Louis.—The double track on the division between Cincinnati and Indianapolis will be probably extended from its present terminus at Fern Bank, 12 miles from Cincinnati, westward about four miles to Cleves, O., during the coming season. The work has not yet been started, and with the exception of one bridge of probably 50 ft. span, the work will be very light. In fact most of the way existing side tracks can be used by simply changing the rail and putting them in better alignment and surface.

Coal Valley.—On Tuesday the Secretary of State of West Virginia granted a charter to the above company to build a standard gauge road beginning at a point on the Great Kanawha River at St. Albans, W. Va., and extending up Coal River to Oceanus, Wyoming County, thence to intersect the Norfolk & Western. The principal office is to be at Charleston, W. Va., and the capital stock is placed at \$400,000. The directors are: Samuel Fulton, of Philadelphia; Andrew Mayer, of Brooklyn, N. Y., and R. P. Chew, J. L. McLean and J. C. Alderson, of West Virginia.

Colorado, Midland.—Since the discovery of the mines at Creede, Col., there have been a good many reports of railroad construction by this company and other Colorado roads. Last week it was reported that this company had decided to build a line to the camps, starting at Hayden near Florissant, Colo., and extending north through El Paso County to the mines. The length of the line will be about 12 miles, and it is stated that it can be built with a two per cent. grade. Lantry Bros. are reported to have the contract for the construction of the line.

Duluth, Mesaba & Northern.—A public meeting was held in the Chamber of Commerce, Duluth, and it was decided to grant \$200,000 in bonds to this company, conditioned upon its locating shops, terminals and ore docks at Duluth, or on the Duluth side of St. Louis Bay. The County Commissioners have been asked to order an election. The company also has a proposition under consideration relative to the use of the St. Paul & Duluth and Northern Pacific terminals in Duluth. F. A. Dole, of Superior, Wis., has a contract on this road from Oneota, Minn., to the main line, 14 miles.

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Donald Grant & Co. last week sublet the contract for the last 16 miles of the 65 miles, and by Aug. 1 the firm expects to have the Bewabik and Iron Mountain mines in Northern Minnesota connected with Duluth by rail.

Forest Central.—This company was incorporated in Pennsylvania last week, to build a road from a point on the Western New York & Pennsylvania road near Tionesta, Pa., along Tionesta Creek to Kellettsville, Pa., the length of the line to be 15 miles. The road is to be three feet gauge. The capital stock is \$60,000. F. F. Whittemore, of Tionesta, Pa., is President.

Great Northwest Central.—If the approval by the government at Ottawa of the surveys for the extension

of this line is not unreasonably delayed, the company expects to complete this year about 100 miles of road northwest toward Saskatoon, which will bring the line to near Sumner, Man. The line is now in operation to Hamilton, near Rapid City, and the extension is to commence at that point instead of from Chater Station as has been previously reported. The surveys have been made for the 100 miles which it is proposed to construct during the coming season, and also for the 80 miles between Saskatoon and Battleford. H. C. F. Forrest of Brandon, is Chief Engineer.

Gu-ley & Paint Rock.—The engineers are to begin a preliminary survey next week from Gurley, Ala., a point east of Huntsville. They will first locate the northern section to Winchester, Tenn., a distance of about 45 miles, and afterward the line south of Gurley to Port Deposit, or another point on Tennessee River. Frank B. Gurley is President and Samuel I. Wheatcroft is Chief Engineer.

Houston Belt & Magnolia Park.—There is said to be a possibility of the construction by this company during the year of a line from Houston to Harrisburg, Tex., six or eight miles in length. The new road through Houston is being ballasted and other improvements are being made for the accommodation of passenger travel during the summer.

Iowa Central.—It is reported that this company is ready to build a branch into Ottumwa if that town will secure the right of way and vote a further bonus. The branch would extend from the present main line near the stations of Fremont or Hedrick south to Ottumwa, and will be about 10 miles long.

Los Angeles Terminal.—In a recent interview in a local paper one of the St. Louis directors who has provided a large part of the funds for building the road stated that it was probable that an extension might be built in the near future to Hueneme, Cal., a small town on the coast south of San Buenaventura. The line may however, be built no further than the Santa Susana Mountains, as the work through the mountains would be very heavy and expensive.

Manitoba & Southeastern.—The company proposes to ask the Provincial Government of Manitoba to assist the project by advancing money on the company's land grant to the extent of one dollar an acre for the first 60 miles. If this is granted the projectors will agree to construct the line from Winnipeg to Ste. Anne, Man., this year.

Mexican Central.—The track on the Pachuca Division has now been laid for about 38 miles, leaving six miles yet to be built to complete the line to Pachuca, Mexico. The line begins at Tula, a station a few miles north of the city of Mexico, extends northeast, reaching extensive mining and milling interests at its terminus. Preliminary surveys have been made from that point to Tampico, but there is no idea of building to the coast at present.

Mexican International.—About 14 miles of the extension now being built beyond Torreon, Mex., was opened for traffic last week. The rails have been laid for 22 miles and the track surfaced for nearly the same distance. The construction work is now making considerable progress and the track will probably be laid into Durango in October. The extension is being built by W. T. Robertson, whose present headquarters are at Torreon, Mex. Durango is the centre of an important mining district, and the construction of the extension will secure for the road a large traffic in silver, lead and iron ore.

Middlesex Valley.—An effort is being made at Rutherford, Naples and other towns in the Middlesex Valley, New York, to secure a subsidy of \$50,000 for this road, which proposes to build along the route of the old Geneva & Southwestern. The towns between Middlesex and Stanley have been asked by the projectors to give \$20,000 and have so far raised about \$15,000 of this amount. The proposed road will be about 20 miles long, beginning at Geneva and extending southwest to Stanley, N. Y., at the foot of Lake Canandaigua. F. B. Merrill, of Canandaigua, the local manager, states that a New York syndicate has agreed to build the road if the towns raise the \$50,000.

Missouri, Kansas & Texas.—Several of the executive officers are making a tour through Jasper and Newton counties in East Texas with resident engineer A. B. Thurston. It is reported that they have arranged for a new survey for the extension of the Trinity & Sabine branch to the Louisiana state line, a distance of about 40 miles from Colmesneil, Tex., its present eastern terminus.

Mooney Lateral.—A charter was granted in Indiana last week to W. W. Mooney, of Columbus, Ind., for this road, which will be a half mile long and is to extend to the tannery of Mooney & Son, near Columbus, from a connection with the Cleveland, Cincinnati, Chicago & St. Louis. The latter company has been unable to build a track to the tannery on account of the opposition of the Pennsylvania.

New Roads.—Henry Elling, of Virginia City, Mont., is organizing a company to build a railroad from that town through Madison County to a connection with the Northern Pacific or with the Union Pacific. It is proposed to build first to Laurin, and from thence two routes are being considered, one extending to the north to connect with the Northern Pacific at Whitehall, and the other to Dillon, on the Union Pacific. The latter route will be 35 miles long and will extend northwest along the Ruby River to the Point of Rocks and thence south up the Beaverhead River to Dillon, the detour to the north being made to avoid the Ruby Mountains.

H. F. Schenck.—H. F. Schenck, of Cleveland Mills, N. C., proposes to construct a road from that point to Shelby, N. C. When the road will be built has not been decided upon and will depend upon the probable cost of construction, which is now being investigated. The line will be narrow gauge and about 10 miles long. It is entirely a private enterprise, not intended for general traffic.

Norfolk, Wilmington & Charleston.—The officers of this company expect to let the contract for grading at least a part of the line south of Norfolk, Va., within the next few months, and to have the work in progress by September. The preliminary surveys from Norfolk to Charleston, S. C., have been completed, as reported last week, and the engineers are now engaged in locating the main line, which will be about 352 miles long. The proposed branch to Columbia, S. C., has not yet been surveyed, but will be nearly 250 miles in length. The main line will extend through Norfolk County in Virginia, and through the following counties: Bertie, Martin, Pitt, Craven, Jones, Onslow, Pender, Bladen, Columbus and Brunswick in North Carolina, and also Horry, Georgetown and Berkeley counties in

South Carolina. The heaviest work on the line will probably be the piling required through the swamp district. With this exception the filling and cutting for the grades will be light. The maximum grade on about 140 miles will be 35 ft. to the mile, and on the remainder of the road 25 ft. The maximum curves will be two degrees. On the main line there will be between five and a half and six miles of trestle and bridge work over important water courses. Thirteen of the streams will require an opening not exceeding 40 ft., excepting, however, the PeeDee and Santa rivers, where openings of 50 ft. may be required.

Northern & Western, of Chicago (Elevated).—Articles of incorporation were filed in Illinois by this company last week, with a capital stock of \$10,000,000, to build an elevated railroad from near the intersection of Thirty ninth and Halsted streets, to near the intersection of Irving Boulevard and Milwaukee avenue. The incorporators are Leander D. Condee, John A. Rose and Oscar S. Bass, of Chicago. One of them is reported as remarking: "We are merely acting as attorneys for Eastern capitalists in this matter. There is no question but the road will be built."

North Hudson County.—The contract for the extension of the North Hudson County Elevated line through Hoboken, N. J., has been let to the Passaic Rolling Mill Co.

North St. Paul Motor Line.—Negotiations are pending for the right of way for an extension, five miles in length, to White Bear Lake. The line will be extended from Silver Lake, the present terminus, to Mahtomedi on the south shore of White Bear Lake and the motive power will be changed from steam to electricity.

Ohio & Big Sandy.—The road which Thompson Brothers have just completed is not, strictly speaking, an extension of this line. The new road is 15.8 miles in length, and diverges from the present main line at the crossing of Sandy River, three miles south of Louisa, and follows the river up to Richardson, and there connects with the old line again. The object in building this piece of road is to do away with the steep grades on the old line between the point of divergence at Sandy River and point of connection at Richardson.

Ohio River.—Arrangements have just been perfected for the completion of the work between Guyandotte River and Kenova, W. Va., for the connection with the Norfolk & Western. The plans and specifications for the bridges, etc., are now being prepared by the Chief Engineer for proposals.

Oxford Coast Line.—An agreement is said to have been made by the projectors of this road with the Seaboard & Roanoke for its lease to the latter company as soon as it is completed. It is understood that the company has arranged to begin work immediately on the section between Oxford and the connection with the Durham & Northern, one of the branch lines of the Seaboard & Roanoke, 4½ miles. The road has been surveyed from Oxford to a connection with the Wilmington & Weldon at Rocky Mount and Nashville, and the projectors will endeavor to complete that part of the line this year.

Petersburg & Chesterfield.—The company been organized by C. F. Z. Caracristi and others of Virginia to build a road from Petersburg northwest to Chesterfield, a distance of about 20 miles, connecting at the latter town with the Farmville & Powhatan. Francis R. Fava, of Washington, D. C., is the Chief Engineer of the company, and has already commenced the survey.

Philadelphia & Newtown Connecting.—The incorporation of the company was secured in Pennsylvania March 1, the capital stock being \$150,000. The new line is to be built from a point on the Tabor Branch of the Philadelphia & Reading, about 2,200 ft. north of Tabor Station to a point on the Philadelphia, Newtown & New York line, about 1,000 ft. north of Olney Station. Both points are in Philadelphia, and the new road will be about 1½ miles long.

Philadelphia & Reading.—The road is reported to be laying tracks on the towpath of the Union canal, opposite the city of Reading, Pa., for the purpose of running coal and freight trains around it, and the tracks may be continued up the line of the canal to Bernville.

Portland, Chicago & Mount Scott.—The grading on this suburban line at Portland, Or., has been practically completed, and the tracklaying will begin in a few days to Mount Scott. Two short trestles will be built, but it is not believed that their erection will delay the opening of the line beyond April 1. The contractors are Payne & Counsel.

Reading, Lancaster & Baltimore.—The directors are reported to have awarded the contracts to Henry Burger, of Lancaster, Pa., and W. E. Warren, of New York, to build the line between Lancaster and Perryville, Md., at the head of Chesapeake Bay, a distance of 70 miles. Surveys have been made from Lancaster southerly through Berks and Lancaster counties and the towns of New Holland and New Providence to several points on Chesapeake Bay. The engineers are now surveying at Reading, Pa., and the road will probably enter the city from the west, connecting with the Pennsylvania or the Philadelphia & Reading, using the tracks of either road into the city.

Rome Belt.—There is little probability of the construction of the belt line at Rome, Ga., noted last week. The company to build the road has not been organized and the projectors have not made any surveys and do not contemplate taking any definite steps for some time to construct the line.

San Antonio & Aransas Pass.—An amendment has been filed to the charter of the company for the construction of a branch line from the crossing of the Guadalupe River in Kendall County, through Kendall, Gillespie, Llano and San Saba counties to a connection with the Gulf, Colorado & Santa Fe at Brownwood, a distance of 150 miles.

Southern Pacific.—The Engineers have definitely located the line of the coast division from Santa Margarita to Ellwood, Cal. All the rights of way have been granted, and work has been commenced on the faces of the tunnels. It was at first intended to run the road inland, but as now determined it strikes out from San Luis Obispo for the coast, and follows the coast line for most of the distance to Ellwood and Santa Barbara. The distance from Santa Margarita by the fixed survey is greater than by the line at first proposed, being 130 miles, but the coast line will be the cheaper to construct, as it does not run through so mountainous a country. There will be heavier and rougher work on that part of the line between Santa Margarita and San Luis Obispo than there was on the California & Oregon road in the

Siskiyou Mountains. There will be seven tunnels in the first 16 miles, one of them being 3,600 ft. in length.

Virginia Central.—A bill to incorporate this company has been introduced in the Virginia legislature. The company is authorized to construct a road from Hampton or Chesapeake Bay, via West Point, to Harrisonburg, Va.

GENERAL RAILROAD NEWS.

Allegheny Valley.—The transfer of the property to the company organized by the bondholders' committee has been effected and the reorganized company took possession March 1.

Camden & Atlantic.—The annual report of the directors shows gross earnings of \$800,970.27; operating expenses, \$649,253.96; net earnings, \$151,716.31; an increase in gross earnings over 1890 of \$1,478, and a decrease of expenses of \$19,532, an increase in net earnings of \$21,011.

Charleston & Savannah.—The annual report for the year ending June 30 shows gross earnings of \$719,377; operating expenses, \$516,881; net earnings, \$202,496. After deducting taxes, fixed charges, etc., the balance is \$62,108. A dividend of six per cent. on the first preferred income bonds has been declared, payable April 1.

Chicago Junction Railways & Union Stock Yards Co.—A special stockholders' meeting was held in New York, March 1, at which the contracts with Messrs. Armour, Morris, and Swift were ratified. The contract binds the packers to continue to send for 15 years all live stock consigned to them through the company's yards, and to pay the usual charges, which shall amount in the next six years to at least \$2,000,000. All suits are to be abandoned, and the Central Stock Yards are to be transferred to the Chicago company, as well as 1,000 acres of the land at Tollston, Ind.

Chicago & Northwestern.—The gross earnings for January were \$2,236,702, an increase of \$343,296, as compared with the same month of last year.

Cumberland Valley.—The annual report for 1891 is as follows: Gross earnings, \$1,002,111; expenditures, \$816,728; net earnings, \$185,383, showing a decrease in net earnings, as compared with 1890, of \$65,811; gross earnings, main line only, \$963,298; expenditures, \$674,190; net earnings, \$189,108, a decrease of \$62,541 as compared with 1890. The net income is \$9,051, a falling off of \$30,470, as compared with 1890.

Delaware & Hudson Canal Co.—The report for the year ending Dec. 31 gives the following figures:

	1891.	1890.	Changes.
Gross receipts	\$19,109,202	\$19,180,848	D. \$71,646
Expenses	13,511,776	13,101,176	L. 410,620
Net receipts	\$6,597,426	\$6,079,672	D. \$482,246
Charges	3,393,377	3,511,333	D. 117,957
Surplus	\$2,204,049	\$2,568,338	D. \$364,289
Dividends	2,100,000	1,715,000	I. 385,000
Surplus	\$104,049	\$853,338	D. \$749,289

The amount earned on the stock was 7.31 per cent., as against 10.48 per cent. the previous year. The receipts from coal during the year 1891 amounted to \$8,335,009, as against \$7,375,378 in 1890. The receipts from railroads were \$10,002,323, and miscellaneous receipts and interest \$711,869.

Housatonic.—William H. Stevenson, Vice-President of the Housatonic Railroad, says that the Meriden, Cromwell & Waterbury Railroad was not bought by the New York & New England Railroad as has been reported, but by William H. Starbuck and his associates, for the Housatonic Road.

Kansas City, Fort Scott & Memphis.—Stockholders are offered the rights of subscription to a new issue of \$500,000 of the bonds issued for building the bridge across the Mississippi at Memphis, to the amount of one-fourth of their holdings of preferred stock. The bonds are 40-year first mortgage five per cent. bonds of the Kansas City and Memphis Railway & Bridge Co., and are guaranteed by the railroad company at 92½ per cent. The company issued \$2,500,000 of these bonds in June, 1886, but it is now explained that the cost of the bridge will be greater than estimated by reason of increased cost of piers for foundations, increased weight in the superstructure and the substitution of steel spans instead of trestle work, as recommended by the chief engineer. The high waters have caused nearly a year's delay in building the bridge, which it is now expected will be completed early in May.

Lake Shore & Michigan Southern.—The company reports the earnings for the year ending Dec. 31 as follows:

	1891.	1890.	Inc. or dec.
Gross earnings	\$6,000,941	\$5,676,836	I. \$324,105
Operating expenses	3,752,591	3,525,857	I. 221,734
Net earnings	\$2,248,350	\$2,150,979	I. \$97,371
Other income	114,221	177,082	D. 62,861
Total income	\$2,362,571	\$2,328,061	I. \$34,510
Fixed charges	1,003,152	1,117,293	D. 24,141
Net income	\$1,269,420	\$1,210,769	I. \$58,651
Cash on hand	3,367,765		
Profit and loss surplus	11,359,116		

Michigan Central.—Surveys are being made for an extension of a lumber branch through Cheboygan County. It is said that the surveys have been made northwest to Roger City, Mich., a distance of 50 miles, and that it is the intention to construct about 30 miles of the road this year.

New York & Northern.—A plan of reorganization has been proposed by the directors for the issue of preferred stock in place of the present second mortgage bonds. The company is not earning interest upon its second mortgage bonds and cannot do so unless additional expenditures for the development of traffic are made. It is suggested that the second mortgage four per cent. bonds should be exchanged for a five per cent. first preferred stock at par for the principal and one year's interest and the mortgage canceled. The present preferred stock is to be second preferred stock. The floating debt is to be funded into five per cent. debenture bonds. A consolidated mortgage is recommended for the purpose of taking up the first mortgage bonds at maturity, the debenture proposed and for betterments and extensions. This plan is recommended to be carried out without foreclosure of the second mortgage if 90 per cent. of the bonds assent: otherwise the report suggests

a foreclosure under the second mortgage and a reorganization under this plan.

Philadelphia & Reading.—The statement of the earnings of the company for January, 1892, as compared with the same month of 1891, is as follows:

	1892.	1891.	Inc. or dec.
Gross receipts	\$1,727,214	\$1,712,190	I. \$15,124
Oper. expenses	984,504	983,114	L. 1,390
Profit in operating	\$742,710	\$728,976	I. \$13,734
Other receipts	71,456	84,366	D. 12,870
Profit for month	\$814,266	\$813,342	I. \$864
Expend. for perm't imp.	35,764	41,452	D. 5,688
One-twelfth fixed charges	625,000	611,769	I. 13,231
Surplus	\$6,076	\$653,291	I. \$7,519
		\$153,442	D. \$6,076
		\$160,121	

Roanoke & Southern.—The lease of this line, which extends from Roanoke, Va., to Winston, N. C., 122 miles, to the Norfolk & Western, was announced last week. It is said that first mortgage bonds of the road to the amount of \$2,000,000 are guaranteed. The Roanoke & Southern was built by the Virginia & Carolina Construction Co., in which a number of Baltimore capitalists are interested, during the last three years. It was only completed to Roanoke last December.

St. Louis & Southwestern.—The company on March 1 began to run its trains into the Union Station in Fort Worth, Tex., using the tracks of the Union Pacific from its crossing with that road at Hodge, about four miles out of the city.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, March 2, 1892.

The Commissioners of the Western Traffic Association have announced a failure to agree in the matter of the appeal of the Atchison, Topeka & Santa Fe from the refusal of the Trans-Continental Association to grant its request to reduce the westbound second-class passenger rate from the Missouri River to Pacific Coast points to \$14.30. The full text of the decision is as follows:

The Commissioners have considered the application of the A. T. & S. F. R. R. Co. for authority to reduce the second class passenger rate to the Pacific Coast points to the sum of \$14.30. The question presented involves the consideration of whether the Commissioners, under the agreement and by-Laws, are required to take measures to enable each line to carry its fair share of the competitive business at the expense of sacrifice of the maintenance of reasonable rates. It is the duty to sacrifice the maintenance of reasonable rates is paramount, but it could not be justified in authorizing the reduction, while if the right of each line to enjoy a fair share of traffic in competition is superior, a reduction in the rate might be found expedient and proper. The Commissioners have been unable to reach a unanimous agreement as to their duty under the by-Law in question, and will present this subject for the consideration of the Advisory Board at its next meeting. In view of the situation as thus presented, the Commissioners report that they are not now able to reach an agreement upon the proposition submitted by the appeal of the A. T. & S. F. R. R. Co., leaving it for the lines in interest to take such other measures as may be open to them under the By-Laws.

The "other measures" which are open to the lines in interest, under the by-laws, are either to appeal to the Advisory Board, or the members of the Advisory Board, on the part of the Santa Fe Company, may give 90 days notice of the proposed change and the date it will be come effective. It is likely that the course pursued by the Santa Fe will be to take a formal appeal from the non-action of the Commissioners, which appeal will come before the Advisory Board at its April meeting.

The action of the Kansas lines in reducing rates on sugar, canned goods, beans and coffee, from Chicago and the Mississippi River, from March 1, to interior Kansas points, without giving the customary notice in the Western Freight Association, has brought out a vigorous protest from the Chicago lines whose termini are at the Missouri River. The action taken was in the nature of a compromise with the Railroad Commission of Kansas, and the lines not parties to it think the others protected themselves at their expense. A meeting of managers was held here yesterday and to day to discuss the situation. It was finally agreed to withdraw the unauthorized tariffs complained of by the Chicago-Missouri River lines, and thus leaves the rates as made by the order of the Kansas Commissioners, viz., 29 cents, fifth class, from Missouri River to Kansas points.

At the meeting of the Chicago committee of the Central Traffic Association to-day further efforts were made to harmonize the difference in regard to switching and cartage charges. The Chicago & Grand Trunk has an arrangement with the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul roads whereby on all freight in either direction switching and all other local charges are absorbed by the Chicago & Grand Trunk. The representatives of the interested lines tried in vain to induce the Chicago & Grand Trunk to cancel this arrangement. They were equally unsuccessful in their efforts to prevail on that road to restore the general switching tariff. An adjourned meeting will be held Friday to further consider the matter. At the present time all the Eastern roads are absorbing switching charges within the city limits, both on east and west bound traffic.

Vice-chairman Donald, of the Central Traffic Association, announces resolutions recently adopted by the Chicago Eastbound Passenger Committee providing that for the season of 1892 no round trip tickets shall be sold to or through any point south of a line drawn through Portland, Me.; Rochester, N. H.; Bellows Falls, Vt.; Rutland, Vt.; and Plattsburgh, N. Y.; that no round trip summer tourist tickets will be accepted from lines through Chicago except when so printed that the portion east of Chicago, in both directions, consists of an exchange order on the initial line at Chicago; and that the round trip summer tourist rate from Chicago to Toronto (except via Niagara Falls or Suspension Bridge) shall be \$22.40 and from Chicago to Buffalo or Niagara Falls and return \$23.30, with limit of 30 days for return passage.

During the month of January the Chicago-St. Paul lines carried 8,352 passengers, distributed as follows:

	Per cent.
Chicago, Milwaukee & St. Paul	30.37
Chicago & Northwestern	22.47
Wisconsin Central	16.41
Chicago, St. Paul & Kansas City	15.93
Chicago, Burlington & Northern	8.26
"Albert Lea" route	6.50

12,102 first class; 35,074 second class; 3,447 third class; 15,632 tourists; 16,417 special excursionists; total, 180,460 passengers.

Traffic Notes.

The reduced fares between St. Paul and Detroit via Mackinaw, established by the "Soo" Line to compete with the lines via Chicago, are still in effect; but the Detroit papers say that very few passengers take advantage of them.

The Michigan Central recently made an application for sixth class rating on grain to Michigan points from Chicago, to correspond with westbound rates, but the Central Traffic Association declined to grant the reduction.

The roads doing business northward from Memphis have agreed to restore passenger rates from March 8, and have strengthened their agreement. The rate to St. Louis is now about \$2 and that to Chicago about \$3 below the normal standard.

The Board of Rulings has issued a decision raising the passenger tariff from Detroit to New York City, 20 cents on first class limited and \$1 on second class. They are now \$15 and \$14 respectively, with differentials of 50 cents, 80 cents, \$1 and \$1.50 by the circuitous routes.

The Central New York Car Service Association has been extended over the Canada, Atlantic, Connecticut River and the Central Vermont roads; also over a portion of the Grand Trunk. Additional stations on the Delaware & Hudson and the Fitchburg have also been taken in.

The Union Pacific has agreed to adopt the reduced freight tariff made for its Oregon lines by the Railroad Commissioners of that State, a compromise having been arranged by which a few modifications will be made in the rates. The suit begun by the Commissioners in the Circuit Court is withdrawn.

The Philadelphia Car Service Association has been enlarged by the addition of a large number of stations on the Pennsylvania and the Northern Central. The Lehigh Valley and the Huntingdon & Broad Top have joined the association, so that it now covers about 1,000 stations. S. M. Prevost, of the Pennsylvania, has been chosen President in place of Alfred Walter resigned.

B. P. Wagener, General Attorney of the Missouri Pacific, has filed an answer in the United States Circuit Court at Topeka in the case of the United States against the Trans-Missouri Freight Association. This is the suit brought by United States District Attorney Ady to dissolve the association. The answer says the act of July 2, 1890, referred to in the bill of complaint, does not relate to the business of common carriers. It denies the existence of any contrivance to monopolize traffic and denies that the agreement in question is in any wise to the injury or prejudice of public good, or against the welfare of the people.

Serious trouble is apparently brewing in the Southwestern Railway & Steamship Association. Vice-President Waldo, of the Missouri, Kansas & Texas road, has notified the association that his road objects to the present Commissioner and to the salary paid him and will not hereafter recognize him or contribute to his salary. He wants a new Commissioner and the salary fixed at not more than \$8,000 a year. The present Commissioner, Mr. J. H. Faithorn, receives \$15,000, and is considered by many as perfectly competent to manage the affairs of the association. He was taken from a similar position with the Western Freight Association, where he was very popular. It looks as though it were a personal matter between the two parties.

Press dispatches report a decision by the United States Supreme Court which seems to confirm the constitutionality of the Michigan law prescribing rates for passenger fares on the roads of the state according to a scale varying in proportion to the gross earnings of the road. The case was that of the Chicago & Grand Trunk vs. Thomas Wellman, and the judgment of the lower court in favor of Wellman was affirmed. It will be remembered that the Chicago & Grand Trunk was the only road directly affected by the law to any great extent, though others had to make reductions on account of the competition of that road. All the roads have, we believe, ignored the law since the Minnesota decision restricting the powers of legislatures to reduce rates.

The report of all tonnage passing through the Southwestern Missouri River gateways carried by the lines, parties to the agreement, for the month of November, 1891, gives the following percentages:

	Tonnage.	Revenue.
Atchison	19.9	21.8
Alton	11.1	11.4
Burlington	19.6	19
St. Paul	5	6.4
Rock Island	13.5	13.9
C. St. P. & K. C.	7.4	7.9
Wabash	7.8	7.2
Mo., Pacific	15.7	12.4
	100.0	100.0

A Decision on the Interstate Commerce Law.

Judge Allen, in the United States Court at Springfield, Ill., Feb. 29, sustained the demurral to the indictments against Milton Knight, General Freight Agent of the Wabash, and J. M. B. Kehler, of St. Louis, a shipper, for violation of the Interstate Commerce act by cutting rates on shipments of flour from East St. Louis to Montreal. The Court held that Congress had no power to make any law regulating railroad rates between points in the United States and points in foreign countries. The indictment was quashed by this decision. In deciding the case the judge said that his attention had been called by the District Attorney to a conclusion reached by the Interstate Commerce Commission in its investigation of the Grand Trunk Railway, wherein it is said that that company violated the Interstate Commerce act by charging less than its established published rates on coal from Buffalo, Black Rock and Suspension Bridge to Hamilton, Ont. The judge said that any conclusion reached by the Interstate Commerce Commission in the exposition or interpretation of the law is entitled to great consideration, but it is not his understanding that the Commission in that case took the ground that it was within its province to inquire into the limits of the power of Congress over the subject matter legislated upon. "The Commission," he said, "is of course essentially a part of the executive government charged with the duty of investigating and reporting upon complaints. The facts found and conclusions reached are given the force and weight at least of *prima facie* evidence, but it is probable that subsequent judicial proceedings are and were originally contemplated for the enforcement of its decisions where obedience thereto is not voluntarily rendered, and such decisions therefore are not controlling."

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The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception.

Year.	No. per year.	Grand total.
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,696	77,540
1889	26,065	103,605
1890	50,502	154,107
1891	39,961	193,168

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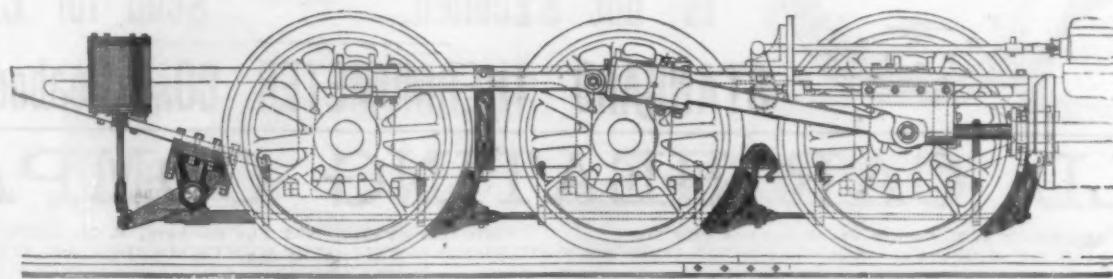
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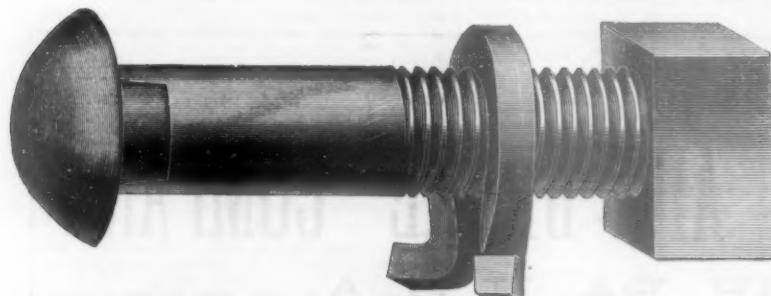
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SAMPLES FREE.

This nut lock is presented on its merits as the best and cheapest device for securing track joints.

It is a torsional loop made of good quality of tempered spring steel, having horizontally inclined foot pieces, which are curved inward, thereby greatly increasing the spring resistance and acting simultaneously; rests upon the base of angle bar, or underlying rail base in case of fish plate, preventing the loop portion from rotating and hammering down *thread of bolt*.

The nut lock for $\frac{3}{8}$ bolt made of $\frac{1}{4}$ in. square steel, standard pattern, yields a tension of 4,300 lbs. on the bolt, which is sufficient to reduce the wear of the bearing surfaces of the angle bars on the rails, imparting, as it does, a uniform bearing the entire length of the bar.

The "Standard" Nut Lock has sufficient elasticity to maintain tight joint, which cannot be truthfully said of many light-weight single coil washers.

The "Standard" Nut Lock is, in its superficial form, similar to an annular coil twisted out of plain, i. e. the curved shoulders or ends of the loop proper are spread in the usual manner of spring coils, at which bearing points the locking friction is equal to that of the best single coil washer, and added to this it is terminated in inwardly curved extensions, which must apparently furnish additional short leverage spring force of a torsional character.

Distinctive Merits of the "Standard" Nut Lock, Condensed:

Fixedness of position—cannot rotate and hammer down *threads of bolt*.

Cannot get one end into elongated slot of angle-bar.

Unlike any permanently placed, double washer, the Standard is interchangeable regardless of distance between bolts.

Cannot be put on wrong side out, as the outward projection of the foot pieces would prevent the nut being turned up.

Has more spring power directly under the nut than any two ordinary coil nut locks.

Being fixed in position, it offers double the locking friction of nut locks, which when in their dead "set" condition turn back with nut by the vibrative effect of passing train.

The "Standard" Nut Lock embodies the old principle of spring power improved by overcoming the objection to the double washer or nut lock, and covering the weak points of the single coil washer.

Excelsior Automatic Nut-Lock and Fish Plate Spring

These Nut Locks have been adopted by the New England Road-Masters, in Conventions held at Hartford, Conn., Oct. 19 and 20, 1887, and Boston, Mass., Aug. 15 and 16, 1888, as the best Nut Locks known.

Sample lots furnished for trial, free of expense, by forwarding the distance between centres of fish-plate bolts. Correspondence and orders solicited.

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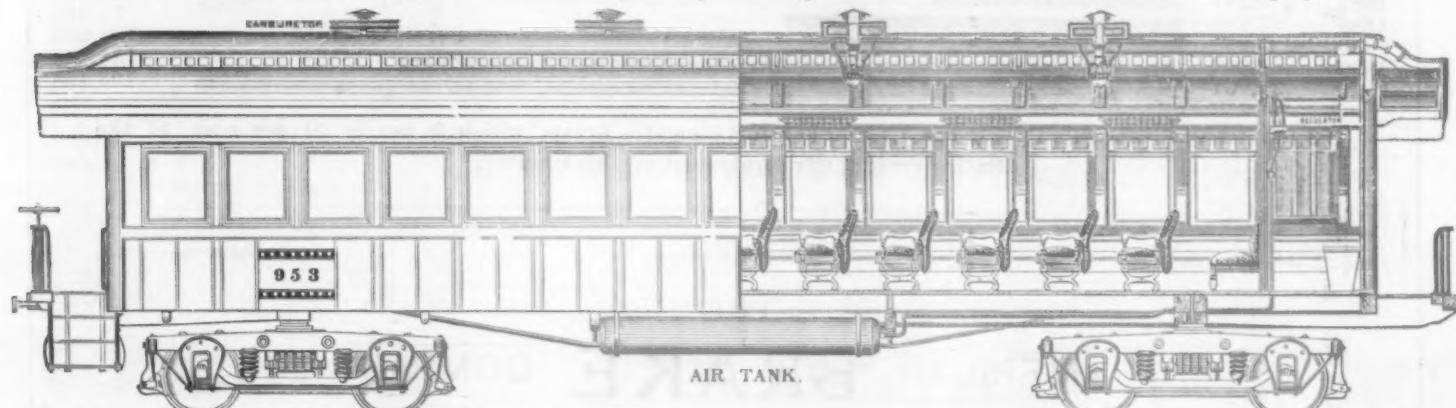
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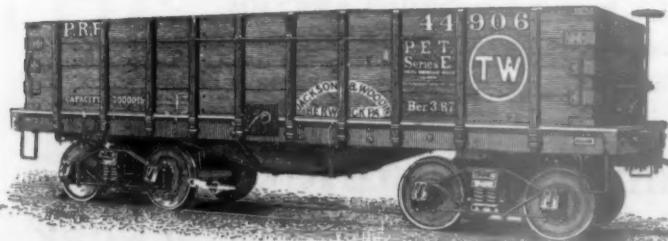
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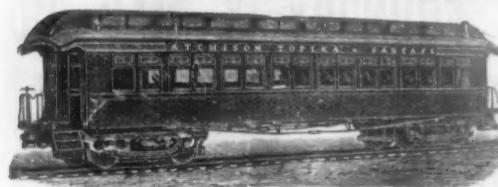
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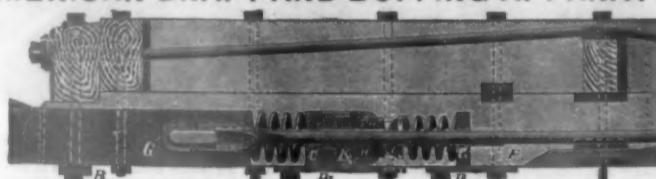


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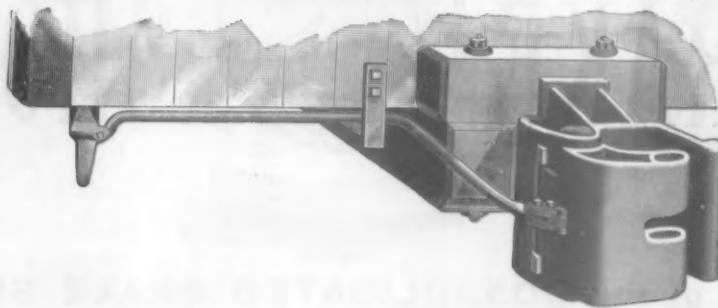
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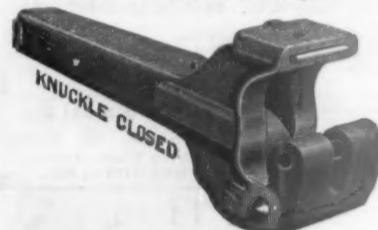
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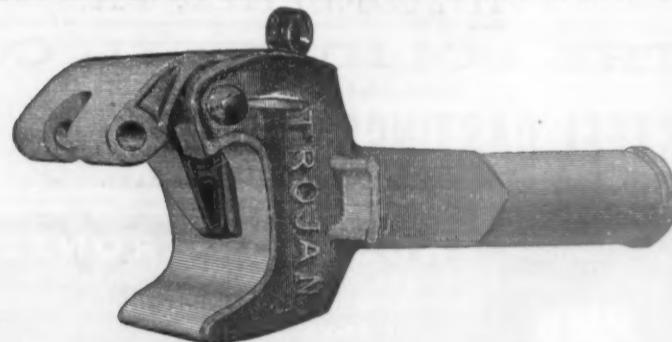
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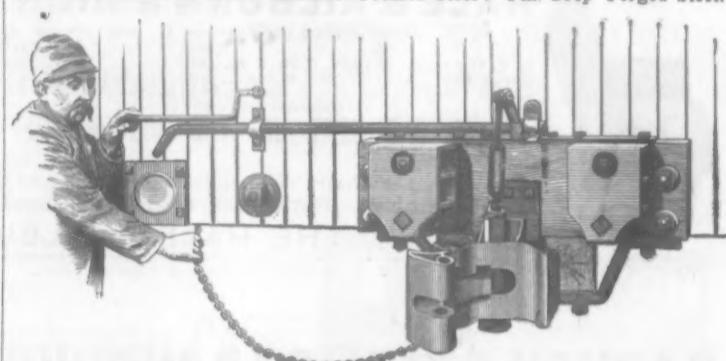
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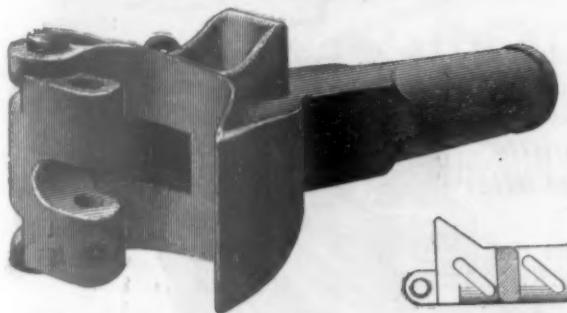
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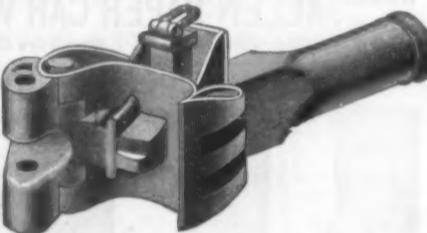
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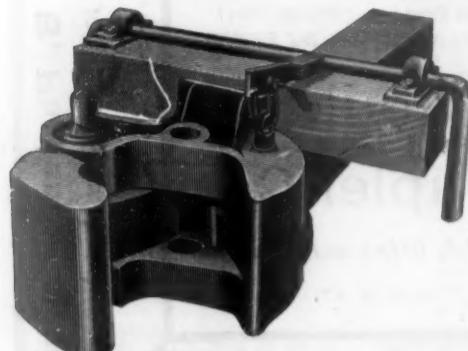
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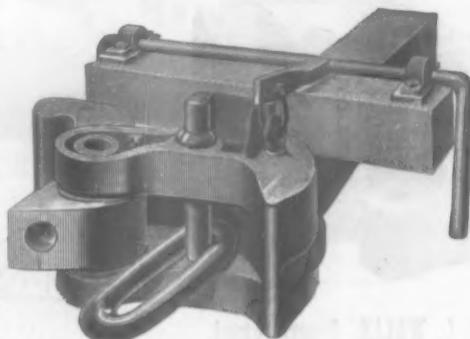
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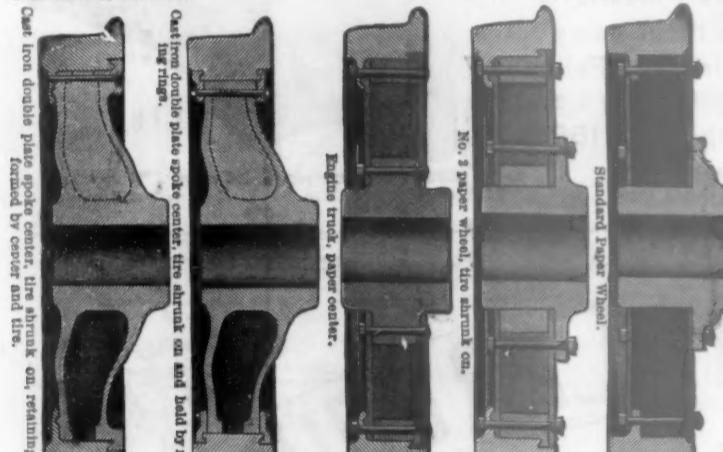
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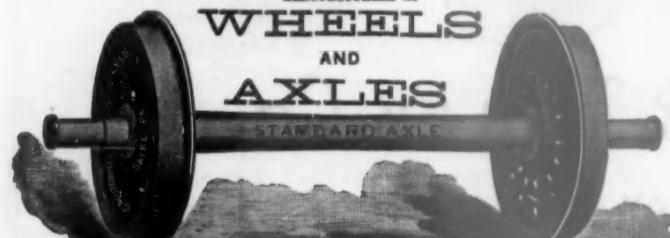
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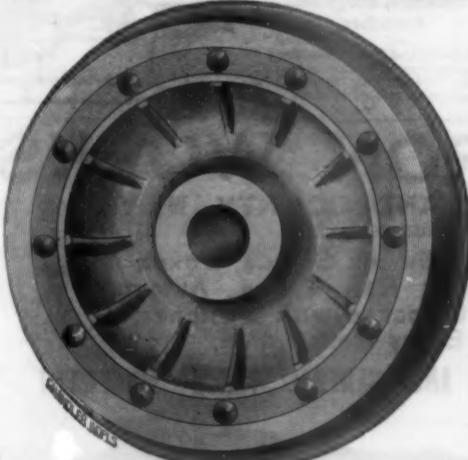
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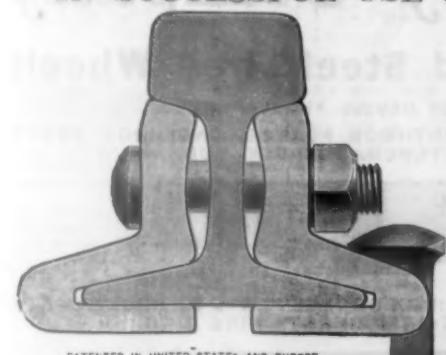
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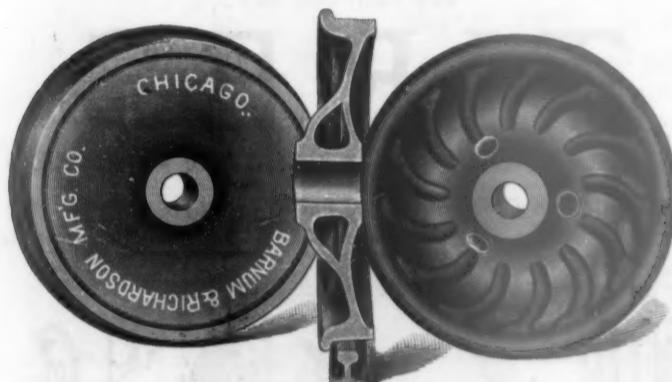
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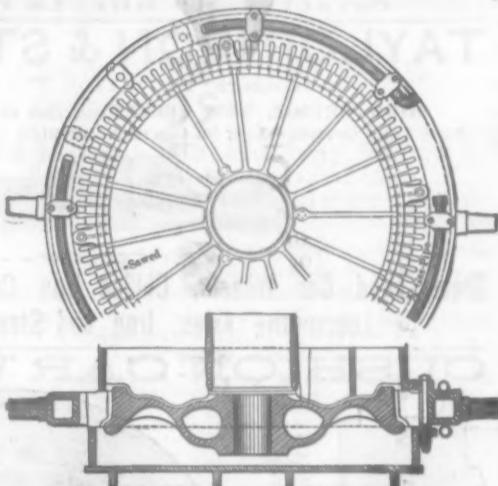
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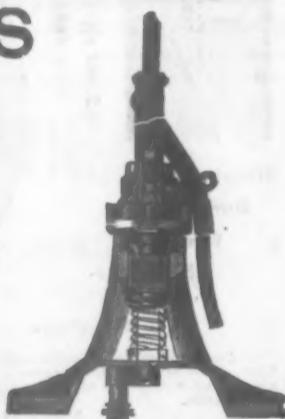
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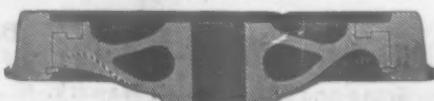
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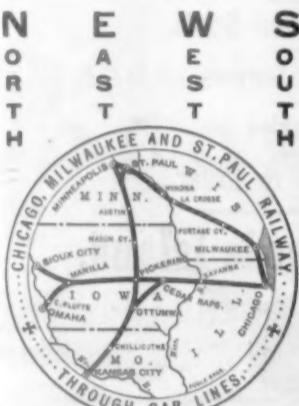
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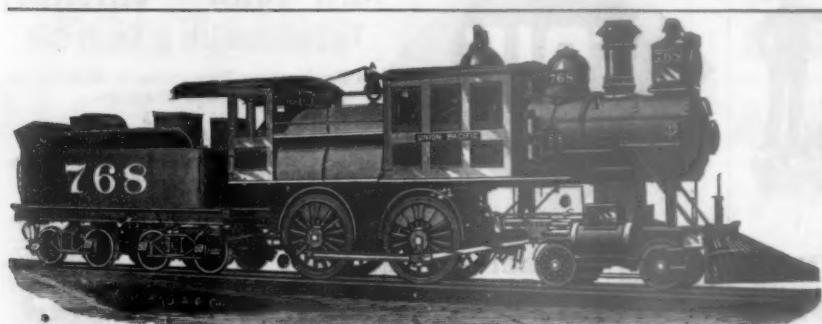
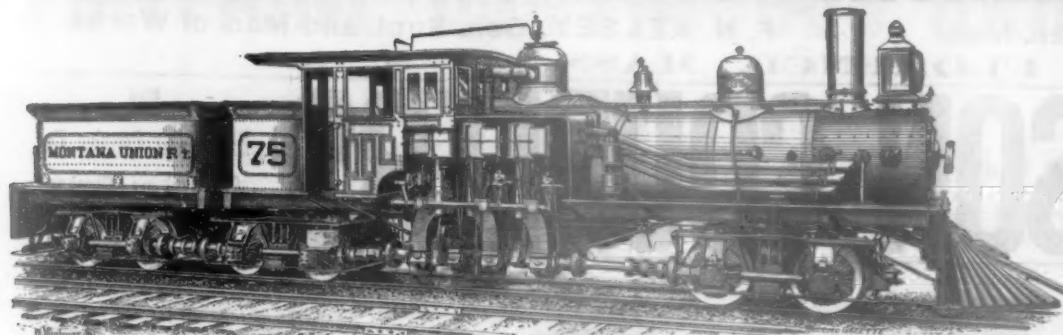
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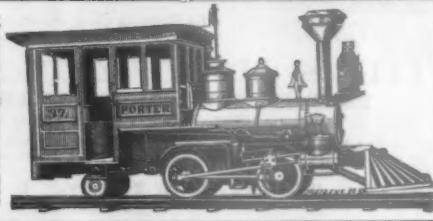


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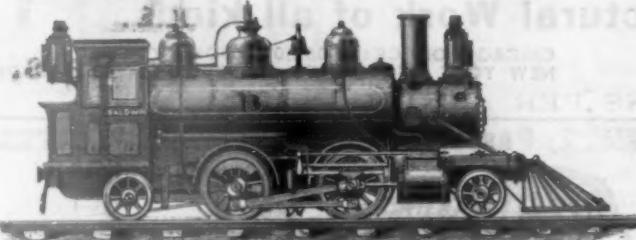
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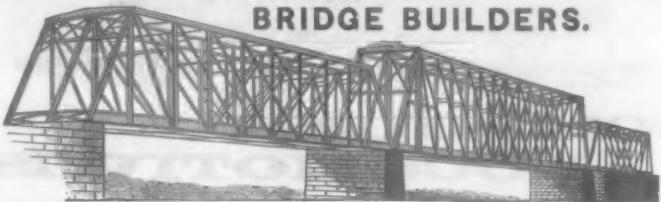
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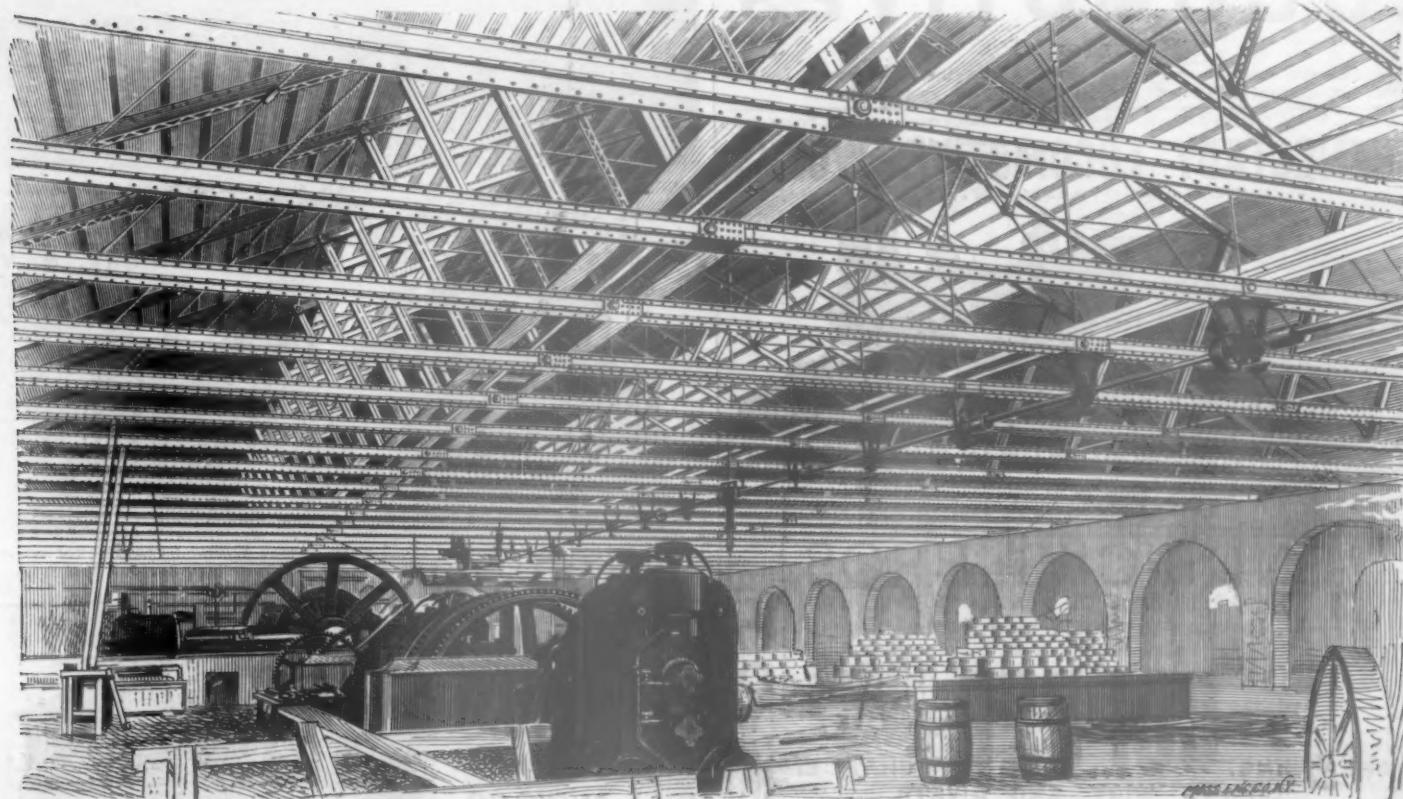
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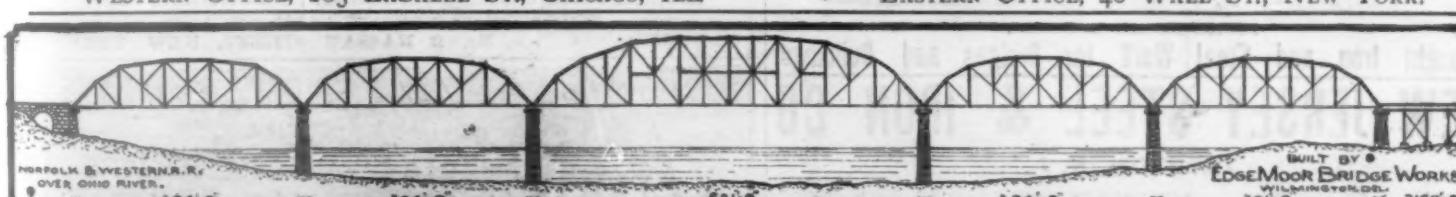
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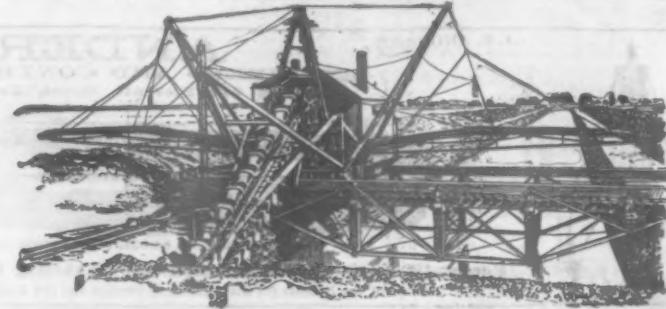
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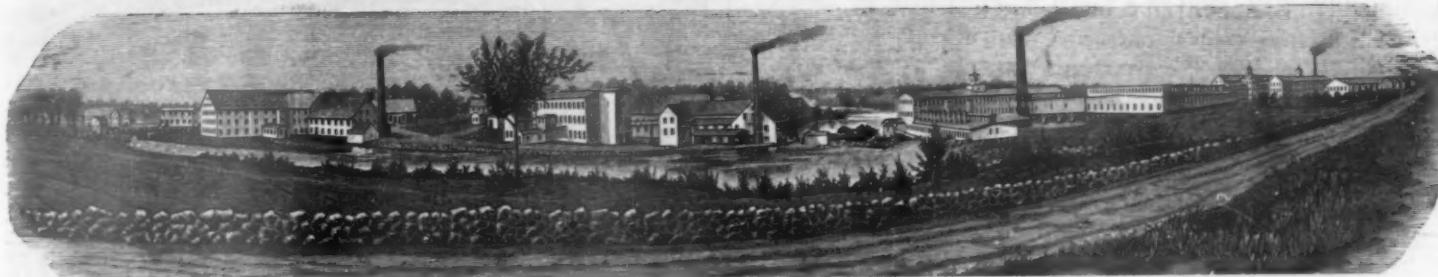
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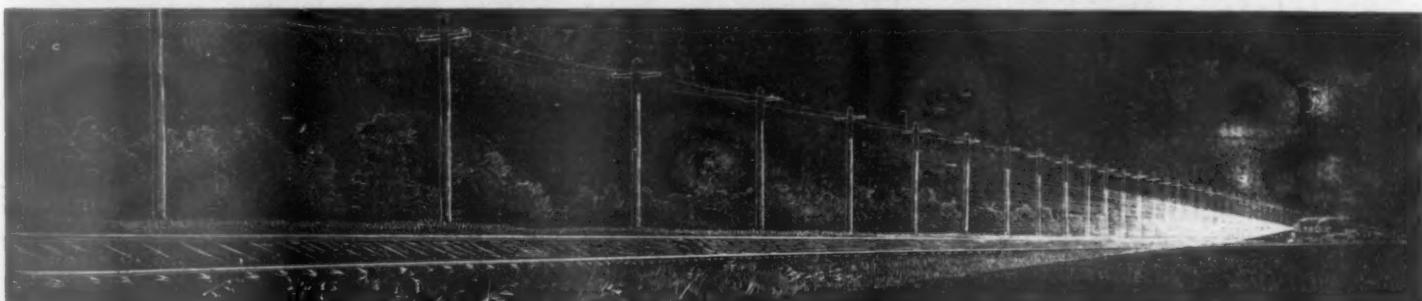
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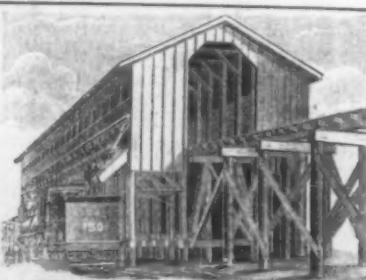
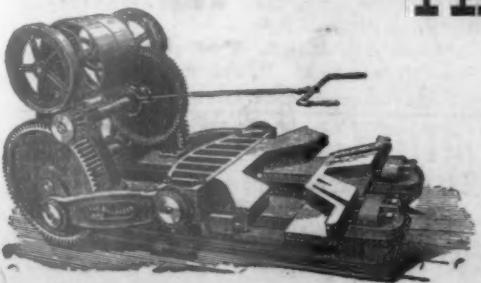
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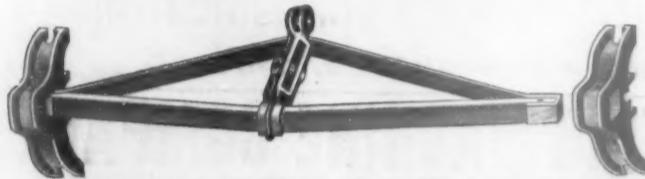
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